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ABSTRACT

The purposes of this study were (1) to provide a method for the quantitative study of grammatical (syntactic) structures which is coherent, systematic, and broad, yet capable of refinement to accommodate details, and (2) to search for the developmental trends in the frequency of various grammatical structures written by students of average intelligence (IQs ranging from 90-110) in the fourth, eighth, and twelfth grades. Nine boys and nine girls were selected from each of the three grades, and close to 1000 words of writing were obtained from each student. The writing was done in class without alteration by anyone other than the writer, and the subject matter was not controlled by the investigators. In addition to sentence length, clause length, subordination ratio, and the kinds of clauses, the study analyzes structures within a clause: coordinated structures, nominals, the verb auxiliary, main verbs and complements, modifiers of verbs, and predicate adjectives. The results of this study are discussed at length, and tables provide additional information about the procedures used and data obtained. This report was written for two groups: the teacher or supervisor of English and the researcher in language development. (RB)

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GRAMMATICAL STRUCTURES WRITTEN AT THREE GRADE LEVELS

by
KELLOGG W. HUNT

NCTE Research Report No. 3

NATIONAL COUNCIL OF TEACHERS OF ENGLISH
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PURPOSE OF THIS STUDY

This study provides, for the quantitative study of grammatical (syntactic) structures, a method of procedure which is coherent, systematic, broad, yet capable of refinement to accommodate details.

The study was a search for developmental trends in the frequency of various grammatical structures written by students of average IQ in the fourth, eighth, and twelfth grades. Each student provided a 1,000-word sample of writing.

The study analyzes (in addition to sentence length, clause length, subordination ratio, and kinds of subordinate clauses) structures within a clause:

coordinated structures,
nominals,
the verb auxiliary,
main verbs and complements,
modifiers of verbs,
predicate adjectives.

National Council of Teachers of English

Research Report No. 3

In 1962, the Executive Committee of the National Council of Teachers of English established an award to be given annually to a research study that makes a significant contribution to the teaching of English. The first committee appointed to make recommendations for such an award unanimously recommended the Kellogg Hunt study, *Grammatical Structures Written at Three Grade Levels,* and presented the award at the annual Council convention in 1964. After examining a number of studies, the committee felt that the Hunt study more than others provided new tools for language research and suggested new objectives in language teaching that might well prove to be of major significance.

Teachers have long known that the language performance of younger children is different from that of mature people. Shrewd guesses had been made to pinpoint the differences and various studies had tended to confirm the guesses without really adding great enlightenment or understanding of the process of change. Part of the difficulty lay in the grammatical systems being used to analyze language structures. They seemed as crude as yardsticks for measuring millimeters. Furthermore the classification of a language structure used by children depended upon the subjective judgment of the investigator, sometimes only after the investigator had changed the actual language the child had written.

Like many of the more significant research studies that have pointed real directions, Hunt's study is limited in the amount of raw data from which he worked. But this very limitation made possible a far more detailed analysis than might have been possible with masses of data. Using understandings from newer linguistic methods, Hunt has worked out a scheme for the analysis of written work that seems to minimize the subjective interpretations and arbitrary classifications that earlier investigators have ultimately had to use. His construction of the T-unit, for example, overcomes the problem of what is or is not a sentence and therefore establishes a base unit that can be systematically investigated.

The consistency of patterns of change from one grade level to the next begins to suggest a source of teaching objectives. The fact that Hunt establishes even further changes in the same direction in the work of mature professional writing suggests that there is such a thing as "linguistic maturity" quite apart from mere stylistic choices and considerations.

Objectives for the teaching of language have been somewhat fuzzy. When they are stated as "gaining control over one's native language" or "using language that is comfortable for the user and the receiver," they offer little precise direction to the individual teacher or curriculum maker faced with the job of teaching boys and girls at a given grade level. Furthermore, they offer little help in evaluating the efficiency of instruction.

Hunt's study offers a kind of operational definition of language objectives for the school: the school's program should facilitate the student's moving in the direction of mature writing patterns. Table 55 provides a neat summary of the changes that represent growth directions.

Hunt points out that his study has no direct implications for problems of methodology and curriculum. It does not discuss whether or not students should be given a conscious knowledge of grammatical structures they are using, of the possible impact of drills asking students for expansions or reductions of sentence patterns, of providing a rich expressional program where students have a wealth of opportunities to express ideas and experiences of importance to them, or of the relative emphasis to be given to oral and written language practices. Such problems, basic to establishing a curriculum in English, remain matters of armchair speculation because the profession has not had a really valid way of measuring what is achieved as the result of different kinds of instructional programs. Hunt's study does offer the possibility of establishing objective criteria for measuring language change that may make the testing of curricular theories possible.

G. Robert Carlsen
University of Iowa

ACKNOWLEDGEMENTS

This study has been possible only because of the help provided by many people. The staff of the Florida State University School administered the tests to the students and collected the pieces of student writing. Ronald Coulthard, Cherrill Heaton, and Daniel Howell assisted with the grammatical analysis. Robert Clark and Terry Swango both checked every piece of analysis. Howard Stoker and Isaiah Moyel took care of the statistical analysis. Julia Lawson wrote the program to sort the nominal structures. In order to free the Project Director, Francis Townsend has performed many extra tasks in the English department.

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Elizabeth Hunt has helped with the project from the beginning. Philip and Susan have forgiven their father for his temporary neglect.

The research reported herein was supported through the Cooperative Research Program of the Office of Education, U. S. Department of Health, Education, and Welfare. This is a revision of CRP #1998.

FOREWORD

This report is written for two groups of readers: the teacher or supervisor of English and the researcher in language development. The two do not have identical interests.

Either reader may want to start with the summaries at the ends of the chapters. The teacher or supervisor may want to ignore the tables, at least in a first reading. The tables and figures are interpreted in the text.

The tables are included primarily for the researcher in language development. He may use them as points of reference in comparing the results of his own original work. He may find in the tables information to support conclusions and interpretations which have escaped the investigators. He may find in the tables occurrences too rare to justify any conclusion but frequent enough to excite a hunch worth exploring further. Or by reference to the tables he may be able to decide whether a new idea which he is tempted to explore promises to be fruitful. For those reasons, the tables sometimes contain more detailed information than the conclusions drawn in the text require. Some of those details survive as markers of dead ends. They say in effect, "The investigators thought this information might turn out to be worth picking up. You need not waste your time getting the same information all over again." Signs saying "No Thoroughfare" should not all be torn down.

From this report the language researcher should pick up some fresh ideas for his own work. He may find, for instance, that the Synopsis of Clause-to-Sentence Factors is a new tool with a wide variety of applications. A number of suggestions for further research appear at the end.

The reader who is not acquainted with statistical terms need not be repelled. He can skip them.

KELLOGG W. HUNT
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CHAPTER 1. INTRODUCTION

1-1. The Purpose of This Study

The purpose of this study is twofold:

1. To provide, for the quantitative study of grammatical (syntactic) structures, a method of procedure which is coherent, systematic, broad, yet capable of refinement to accommodate details.
2. To search for developmental trends in the frequency of various grammatical structures written by students of average IQ in the fourth, eighth, and twelfth grades.

1-2. Related Research

No detailed review of language development studies need be given here since such a review was made by McCarthy in 1954 and by Carroll in 1957.

It has become almost standard procedure in studies like this one to determine mean sentence length, mean clause length, and subordination ratio. Subordinate clauses are usually divided into noun, adverb, and adjective types, and the frequency of each type is studied. Adverbial clauses are often subclassified according to different categories of meaning.

Among those investigators who have contributed to what is called here the standard procedure are Bear, Davis, Frogner, Heider and Heider, LaBrant, Stormzand and O'Shea, Watts.

Much that same sort of analysis begins this study. However, a different unit is studied along with sentence length, clause length, subordination ratio, and kinds of subordinate clauses. The study then moves into an analysis of structures within the clause: coordinated structures, nominals, the verb auxiliary, the main verbs and complements, modifiers of verbs, and predicate adjectives.

CHAPTER 2. PROCEDURE

In order to make possible an intensive analysis, the total corpus of writing was kept smaller than that used in some of the biggest studies. Secondly, a larger sample of writing from each individual was used: one thousand words. Third, in order to maximize the chance of finding at least some significant differences between grade levels, a long time span was used. Fourth, only "average" IQ students were used: those with scores between 90 and 110.

2-1. The Choice of Grades

The fourth grade seemed a good place to begin. Before the fourth grade, children may jabber away with ease, fluency, and exuberance, but most third graders write only under considerable duress. Any parent who has tried to get his third grader to write thank you notes after Christmas knows that it is no harder to pull a tooth that isn't ready to come than to extract writing that isn't yet ready to come. But by the fourth grade, most average children are ready to write.

The twelfth grade seemed a good place to stop. If there is any change at all, a span as long as eight years could certainly be expected to catch most of it. If the change is only slight, then a span this long might be needed to show what little there is.

The eighth grade was chosen primarily to provide a check point halfway between fourth and twelfth. If differences should appear, it would be interesting to know whether they seem to appear in the first half or the second half of the period, or equally in both. The gains might be early, or late, or steady.

2-2. The Specifications for the Writing

All fourth, eighth, and twelfth graders at the Florida State University School were given the Short Form of the California Mental Maturity Test. The school population is such that it was barely possible to find in each grade nine boys and nine girls, plus one or two extras, whose IQ scores were below 110.

In classes where these ten or eleven were enrolled, all students were given the same writing assignments even though the teacher knew that not all writings would be analyzed.

The teachers were told, "During this trimester, have each student write more than a thousand words. Let his subject matter be whatever he normally writes about in school. Make sure that all writing is done under your supervision so there can be no contamination from any outsider. Make no changes in what the student hands in to you. Merely count his words to see when he has produced over a thousand."

The number of words for each student was counted, and each student's sample was terminated at the end of the sentence closest to the thousandth word. A number code rather than the student's name appeared on each paper.

2-3. The Subject Matter of the Writings

It would have been possible to get students in all three grades to write in response to the same general stimulus, though of course it would take many more sittings to get a thousand words from fourth graders than from twelfth graders. Movies could have been shown, or uniform subjects could have been assigned. In this fashion, differences in the writings due to differences in subject matter could have been reduced.

However, it is debatable whether the differences in subject matter ought to be reduced in a study which aims to describe the grammatical structures that are characteristic of students as widely separated as from fourth to twelfth grade. Perhaps twelfth graders characteristically write on subjects that fourth graders cannot be expected to write about. And perhaps they need to learn to use the structures appropriate to those more mature subjects. In that event it might be wisest to let each grade write on subjects characteristic of its own grade uninfluenced by the subjects being used four years or eight years earlier or later. There may be a virtue in allowing characteristic differences in subject matter to exert their influence on the writing sample.

Actually this debate may be more nominal than real. When a fourth grader writes on "How to play kickball," his account is likely to become "What happens to me when I play kickball." The twelfth grader is more likely to abstract and generalize about the game. In effect, the treatment might turn out to be characteristic of the writer's habitual mode of thought and expression regardless of the stimulus, providing that stimulus is sufficiently broad to allow the writer this freedom.

Assignments which narrowly constrain the writer's mode of treatment to concrete narrative or abstract argumentation would, of course, be an entirely different matter.

In any event, the choice of subject matter was not constrained by the investigators in this study.[1] Each grade wrote on a variety of subjects.[2] It remains for other studies to determine whether the differences in expression found here would have failed to appear if all three grades had been assigned the same broad or the same narrow subjects.

2-4. Certain Shortcuts in Reporting the Findings

In reporting the frequency of various events, it will not be necessary to repeat "in so many words," because of certain equivalencies in the population and the corpus. Each student has virtually the same number of words as every other—usually within 1 percent of a thousand. The number of boys equals the number of girls in each grade: nine. The number of students in one grade equals the number in each other grade.

Needless to say, the distinction will not always be maintained between "these fourth graders" and "fourth graders."

In reporting the number of occurrences of something in the three grades, the order of the occurrences, unless otherwise specified, will always be for the fourth grade first, the eighth grade second, and the twelfth last—the time order. To indicate whether the change from grade to grade is of large proportions or small, percentages will sometimes be used. (The change was from 43% to 87% to 100%.) When that is done, the number of occurrences for twelfth graders will always be taken as 100 percent—as if twelfth grade performance were the target toward which younger students moved.

---

[1] One small exception should be mentioned. All three grades did in fact write one theme in response to a fifteen minute cartoon movie on *Moby Dick*. The subsample thus produced was about fifty words long, on the average, for fourth graders. Such a sample is too small to justify publishing the results of analysis, but it was long enough to reassure the investigators that obvious differences did exist characteristically between the grades even when the stimulus was similar.

[2] All three grades wrote about books they had read and about personal experiences; they wrote evaluations; they wrote about how to do things. Fourth grade subjects included how to play kickball, how to play baseball with spelling, what the visitor said about water safety and fire prevention, students' vacations, dogs and cats and tree houses and dirt fights, what they liked and didn't like about movies and books and the circus.

Most eighth grade students wrote one theme summarizing what a movie had shown them about America's step-by-step expansion of territory from colonial days. Most students wrote about the population explosion and the history of transportation. They wrote about integration, about the strategy at Antietam. They created stories, one about a drunken bus driver who went from Florida to California without letting his passengers off the bus.

The twelfth graders also wrote about books they had read (the revenge or ambition theme in *Macbeth*, for instance); about personal experiences (my job, my father's business, for instance); they wrote evaluations and told how to do things (how to write a good theme, for instance). Most of them wrote one theme on the necessity for limiting freedom of expression.

2-5. The Word "Maturity"

In this study the word "maturity" is intended to designate nothing more than "the observed characteristics of writers in an older grade." It has nothing to do with whether older students write "better" in any general stylistic sense.

2-6. Summary of Procedure

1. The students whose writings were analyzed were selected from those receiving scores of 90-110 on the California Test of Mental Maturity (short form). All were from the University School of the Florida State University at Tallahassee.

2. Nine boys and nine girls were selected from each of three grades: eighteen per grade, fifty-four in all.

3. The grades were fourth, eighth, and twelfth.

4. Close to 1,000 words of writing was used from each student. Usually the number of words was within 1 percent of 1,000.

5. The writing was done in class and was not altered by anyone other than the writer.

6. The subject matter was not controlled by the investigators. They wanted the subjects to be characteristic of what each grade was writing about in school.

CHAPTER 3. FINDINGS: FACTORS RELATING CLAUSE LENGTH TO SENTENCE LENGTH

3-1. Garbles

Before the writings could be analyzed, a small amount of extraneous matter had to be excluded. A piece of this extraneous matter, called a garble, was any group of words that could not be understood by the investigators. Here is a passage from the fourth grader who committed the most garbles. The garble is italicized. Where the investigators felt sure that a word was merely a wrong inflection, the correctly inflected form appears in parentheses.

> The man (men) burned the whales to make oil for the lamps in the town. *And the man in the little boats* and the white whale eat (ate) the boats up and the white whale went down and came up and eat (ate) The other up too and the rest came back to the ship.

What are here called garbles are comparable to what Strickland and Loban call mazes.

Even a mature writer may jot down in his first draft sentence beginnings or alternate wordings which he later decides not to work into his sentences. However, the mature writer deletes these jottings so that they never appear in the final communication.

A few of these students, however, allowed their garbles to stand undeleted. It is entirely possible that they never reread what they had written before they handed it in to the teacher. The teacher was instructed to let stand whatever was handed in.

Two eighth graders and two twelfth graders each allowed one garble to stand unrevised and undeleted. Fourth graders committed more. One distinguished himself with fourteen garbles totaling 68 words. Another committed three totaling 10 words. Two others committed one each. All these fourth graders were boys. The nine girls committed no garbles. (See Table 1.)

3-2. How Objective an Index Is Sentence Length?

A natural place to begin a quantitative study of writing development is with sentence length. Adults are likely to have the impression

Table 1 — Number of Garbles and Words in Garbles

Grade 4			*Grade 8*			*Grade 12*		
Student number	*Garbles*	*Words in garbles*	*Student number*	*Garbles*	*Words in garbles*	*Student number*	*Garbles*	*Words in garbles*
Boys			*Boys*			*Boys*		
4-1	14	68	8-1	None		12-1	—	—
4-2	—	—	8-2			12-2	—	—
4-3	—	—	8-3			12-3	—	—
4-4	—	—	8-4			12-4	—	—
4-5	—	—	8-5			12-5	—	—
4-6	3	10	8-6			12-6	—	—
4-7	—	—	8-7			12-7	—	—
4-8	1	3	8-8			12-8	—	—
4-9	—	—	8-9			12-9	1	10
Group total	18	81				Group total	1	10
Girls			*Girls*			*Girls*		
4-10	None		8-10	—	—	12-10	—	—
4-11			8-11	—	—	12-11	—	—
4-12			8-12	1	5	12-12	1	2
4-13			8-13	—	—	12-13	—	—
4-14			8-14	—	—	12-14	—	—
4-15			8-15	—	—	12-15	—	—
4-16			8-16	—	—	12-16	—	—
4-17			8-17	—	—	12-17	—	—
4-18			8-18	1	2	12-18	—	—
Group total			Group total	2	7	Group total	1	2
Grade total	18	81	Grade total	2	7	Grade total	2	12

that "younger children write shorter sentences." Several investigators have looked into this matter, two of the most substantial studies having been made by Stormzand together with O'Shea, and by Heider and Heider.

Before any discussion of sentence length can be meaningful, however, one must know what is being taken as a sentence. Obviously a sentence might be taken as whatever a student wrote between a capital letter and a period or other end punctuation. Such a definition has the advantage of being objective. But the investigator who defines a sentence in this way may feel uncomfortable. If he reads while he counts, he will become aware that a fourth grader builds sentences better than he punctuates. Certain children simply do not use periods. Others write innumerable *and's* where an educated adult would have written periods; they under-punctuate. If a sentence is defined as whatever is written between terminal marks, and if sentence length is assumed to be an index of language maturity, then the child who under-punctuates the most or uses *and* the most will, regrettably, be credited with the greatest language maturity.

Confronted by these difficulties, an investigator is tempted to look for some escape. He is tempted to edit the child's sentences, putting in periods "where they ought to go." The trouble with this procedure is that it impairs the validity of the results. In his *Structure of English* C. C. Fries presents a passage which he says a group of teachers will cut into any number of sentences from three to nine.

Harrell, in his review of the literature, remarks that "Most studies using the sentence as a measure have not defined a sentence" (p. 20). He then comments upon the arbitrariness of the decisions made by one of the major investigators.

So "the sentence" presents a dilemma to the investigator. On one horn is an objective unit which cannot be expected to be a very significant index because of the beginner's tendency to write too many *and's* and not enough periods. On the other horn is a unit which can be made to suit the investigator's taste, and so is quite meaningless to anyone but himself. Since the subjective unit is incapable of evaluation by objective means, the present study has nothing more to do with it. The objective unit will now be evaluated, but we cannot expect it to be a good index. We must hope to be able to find a better one.

3-3. The Average Length of Sentences in Three Grades

In each student's writings a count was made of the number of passages set off with capital letters and periods or other terminal punctuation. This number was then divided into the student's total number of words—usually within 1 percent of a thousand—to get his average punctuated sentence length. (Those averages for each student, each grade, and each sex within grade appear in Table 2.)

The averages turn out to be larger for each successively older grade. Fourth graders average 13.4 words, eighth graders average 15.9, twelfth graders average 16.9.[1]

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[1] Stormzand and O'Shea as well as Heider and Heider, respectively, report average "sentence" length for fourth grade to be 11.1 and 10.9 words, figures smaller than the 13.4 words reported above. For eighth graders they report, respectively, 15.2 and 13.7, a figure again smaller than the 15.9 reported above. For twelfth grade Stormzand and O'Shea report 19.8 words, a figure larger than the 16.9 reported above. (See summary by McCarthy, in 3-22.) Heider and Heider's "sentences" do not follow the student's punctuation. Stormzand and O'Shea do not specify what they count as a sentence.

Though average sentence length does increase with successively older grades, it is a far from satisfying index of individual maturity. As we see from Figure 1, the student with the highest average of all was an eighth grader. His average was 30 words, almost twice that achieved by the average twelfth grader. One fourth grader averaged sentences longer than those by any one of the eighteen twelfth graders. This fourth grader was far from precocious in language skills, however, as will be shown in the next section.

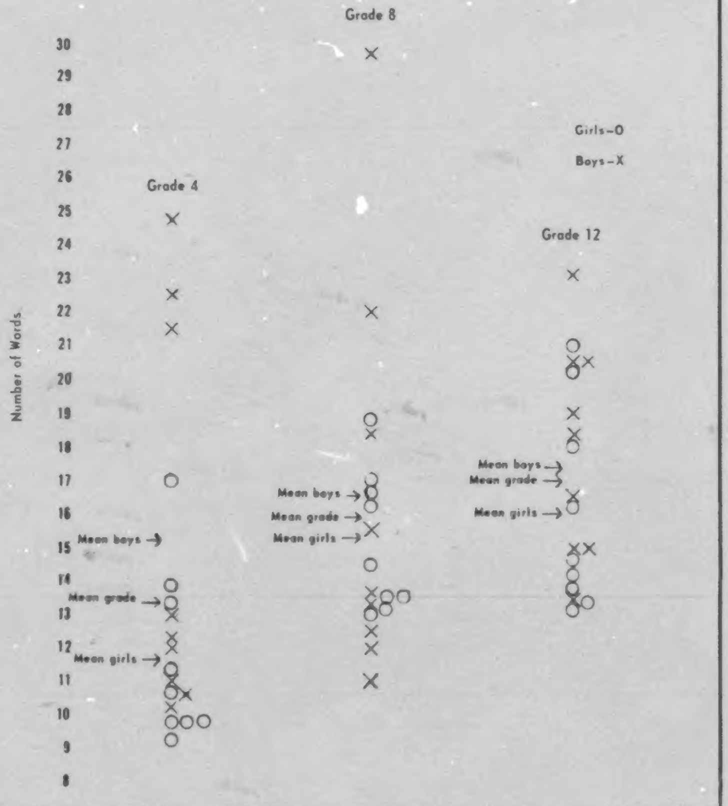
Table 2 — Mean Length of Punctuated Sentences

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Mean length of sentence*	*Student number*	*Mean length of sentence*	*Student number*	*Mean length of sentence*
Boys		*Boys*		*Boys*	
4-1	12.0	8-1	13.3	12-1	18.1
4-2	13.1	8-2	12.0	12-2	14.8
4-3	12.2	8-3	12.5	12-3	13.4
4-4	21.5	8-4	13.6	12-4	19.1
4-5	10.8	8-5	15.6	12-5	23.1
4-6	24.6	8-6	29.7	12-6	20.3
4-7	10.9	8-7	19.4	12-7	20.3
4-8	22.4	8-8	11.0	12-8	16.3
4-9	10.3	8-9	22.0	12-9	14.9
Group mean	15.3	Group mean	16.5	Group mean	17.8
Girls		*Girls*		*Girls*	
4-10	10.7	8-10	14.6	12-10	16.3
4-11	9.7	8-11	18.6	12-11	21.0
4-12	9.7	8-12	16.8	12-12	13.2
4-13	13.9	8-13	13.6	12-13	13.3
4-14	9.7	8-14	17.0	12-14	20.2
4-15	17.0	8-15	13.1	12-15	13.6
4-16	13.4	8-16	13.6	12-16	14.6
4-17	9.3	8-17	13.4	12-17	18.0
4-18	11.4	8-18	16.2	12-18	14.2
Group mean	11.6	Group mean	15.2	Group mean	16.0
Grade mean	13.5 (79%)	Grade mean	15.9 (94%)	Grade mean	16.9 (100%)

As a result of an analysis of variance, 2 x 3 factorial, the significance for sex and for grade was found to be at the .05 level.

Note: Except as otherwise specified in the footnotes to sections 3-15, 3-17, 3-20, all scores in this study called grade means are the means for the 18 scores achieved by the individuals within each grade.

Figure 1
Mean Sentence Length



3-4. Too Many *And's* or Not Enough Periods

The reason that sentence length is no better as an index of language maturity has been anticipated. The fourth grader with the highest average sentence length wrote one whole 77-word composition with no period. He wrote another, reproduced in section 3-8, that was 68 words long and contained no period. For those two themes his average sentence length was 72 words, but to call him precocious for that reason would be absurd.

The two fourth graders with the next highest averages achieved such preeminence by writing prodigiously long run-together sentences. Another two fourth graders used more than 70 *and's* apiece between main clauses, whereas the average twelfth grader used only 5.

Punctuated sentence length may perhaps be a satisfying index of language maturity for superior students or adults, but for young average students it is not. McCarthy was testifying to the paucity of other measures rather than to the adequacy of sentence length when she wrote

> Apparently, then, sentence length is a measure which continues to show increase in normal children until maturity. The use of the measure has been criticized by some writers, and a few substitute measures have been suggested, but none seems to have superseded the mean length of sentence for a reliable, easily determined, objective, quantitative and easily understood measure of linguistic maturity. (p. 550)

And is the only one of the coordinators between main clauses that is used with far greater frequency by fourth graders than older students. The other two common coordinators, *but* and *so* (from *and so*), are used with mature moderation, though indeed it is true that fourth graders used a few more than the older students. The total for each grade is 574, 284, 172. In percentages the decrease is 334 percent, 165 percent, 100 percent. (Details appear in Table 3.)

Though the matter of coordination within clauses will be discussed in a later section, the conclusion of that discussion is pertinent here. In the coordination of individual subjects, verbs, prepositional phrases, subordinate clauses, etc., fourth grade practice is entirely mature. That is true of *and* as well as the other coordinators.

The overuse of *and* between main clauses is a stylistic offense, not a grammatical offense. It is grammatically allowable for almost any two adjoining declarative sentences to be connected with an *and*. The fourth grader merely exercises that option too often for mature taste.

If the writings of these fourth graders are representative of writings from beginners in general, then the number of compound sentences could be expected to vary *inversely* with maturity—unless the sentences are edited into "properly" compounded sentences. In designing any arbitrarily weighted scale such as that suggested by

Davis and used by several recent investigators, it would appear to be better not to assign positive scores to compound sentences written by beginners. Of course one might also ask, "Why bother at all with a measure that is arbitrary?"

Table 3 — Coordinators between Main Clauses

Grade 4					*Grade 8*					*Grade 12*				
Student number	*And*	*But*	*So*	*Other*	*Student number*	*And*	*But*	*So*	*Other*	*Student number*	*And*	*But*	*So*	*Other*
Boys					*Boys*					*Boys*				
4-1	77	4	–	–	8-1	5	2	–	–	12-1	7	–	–	–
4-2	11	10	6	–	8-2	2	8	1	–	12-2	2	3	–	–
4-3	11	5	7	–	8-3	7	4	–	–	12-3	4	1	1	–
4-4	47	2	4	–	8-4	7	3	–	–	12-4	7	1	–	Or(1)
4-5	11	0	6	–	8-5	7	2	3	Or(1)	12-5	6	3	–	–
4-6	75	10	5	–	8-6	5	6	4	Or(3)	12-6	3	3	–	–
4-7	11	4	1	–	8-7	5	8	1	–	12-7	8	–	–	–
4-8	29	4	1	–	8-8	5	7	–	Or(1)	12-8	3	3	1	Or(1)
4-9	8	4	6	Nor(1)	8-9	10	15	7	–	12-9	3	2	1	–
Group total	280	43	36	1	Group total	53	55	16	5	Group total	43	16	3	2
Girls					*Girls*					*Girls*				
4-10	8	6	10	–	8-10	7	5	4	–	12-10	4	4	3	–
4-11	9	3	2	–	8-11	19	6	3	–	12-11	11	10	–	–
4-12	14	2	2	–	8-12	2	1	1	–	12-12	3	6	1	–
4-13	7	6	3	–	8-13	4	1	1	For(1)	12-13	–	7	–	For(1)
4-14	18	3	2	–	8-14	12	6	4	For(1)	12-14	2	2	1	–
4-15	25	9	6	–	8-15	20	4	1	–	12-15	4	–	–	For(2)
4-16	26	7	10	–	8-16	9	2	5	–	12-16	4	8	–	–
4-17	5	1	3	–	8-17	19	3	1	–	12-17	4	5	1	–
4-18	16	7	4	–	8-18	7	4	2	–	12-18	12	11	1	Or(1)
Group total	123	44	42	–	Group total	99	32	22	2	Group total	44	53	7	4
Grade total	408	87 (574)	78	1	Grade total	152	87 (284)	38	7	Grade total	87	69 (172)	10	6
Grade mean	23	5	4		Grade mean	8	5	2		Grade mean	5	4	1	

As a result of an analysis of variance, 2 x 3 factorial, the significance of *and* was found to be for grade at the .01 level and for sex at the .05 level.

3.5. The Search for a More Valid Index: Clause Length and Subordination Ratio

One of the valuable pioneering studies in language development was carried out by Lou LaBrant more than thirty years ago. A reexamination of her conclusions and her method of analysis is now worthwhile, for a misapprehension arising from her work has apparently affected the course of language development studies during the last thirty years.

She studied the length of what she sometimes called clauses, both main and subordinate, and concluded "Apparently length of clause is not a significant measure of language development for children in Grades 4 to 12, inclusive" (pp. 467-468). Yet even though she drew this conclusion, she did so in spite of certain evidence which she recorded: "While the average clause written by children in Group A [grades 4 to 9 inclusive] contains 7.2 words, and that by high school pupils (Group B) only 8.0, the formal writing of the [eminent] psychologists here studied averages 15.2, or nearly twice as many to a clause" (p. 475). Furthermore, she does record an average clause length of 6.6 words for students of mental age 121-130 months (fourth grade) and 7.6 words for students of mental age 171-180 (eighth grade). This is an increase of 15 percent over four years. Actually, though she stated that there was no difference in scores for grades 4 to 12, her data did not distinguish between scores for students in the different high school grades. "Since the *Terman Group Test of Mental Ability* is standardized on the assumption that mental development ceases at about year 16, it seemed best to attempt no detailed analysis by mental-age groups, but to treat the 504 [high school] cases as a unit" (p. 464). Although she concluded that no growth occurred, she could hardly have intended that her conclusions should be taken as final.

Concluding that neither sentence length nor clause length is a significant index of maturity, LaBrant concentrated her study on the ratio of what she called dependent (subordinate) clauses to all clauses both dependent and independent (main). She called this percentage figure the subordination index or subordination ratio and concluded that "The percentage of dependent clauses used in writing increases until age 16 or above" (p. 485). She noted also that her eminent psychologists had a ratio markedly higher than that of her schoolchildren. In summary, then, she concluded that clause length did not increase with age, but that subordination ratio did.

However, it is important to note that what LaBrant speaks of in these quotations as clause length and clause ratio is not based on a count of what is ordinarily understood to be a single clause. For instance, the expression "I am studying books and working hard" would ordinarily be considered a single clause 7 words long, containing 2 coordinated verbs. However, after giving this example LaBrant comments, ". . . predicates containing two or more participles or complementary infinitives after a single auxiliary were counted as two predicates" (p. 411). Consequently, the example quoted would be figured as two clauses totaling 7 words and averaging only 3½. An average of 3½ is quite different from an average of 7. Obviously the results of the study will be affected by this choice of procedure. The expression "number of predicates in clauses" slides over into the "number of clauses," and the latter is likely to be interpreted differently by the reader of her study.

There are obvious objections to LaBrant's practice of counting coordinated verbs as if they were whole clauses. For one, the results are likely to be misinterpreted. Secondly, the practice mixes two factors that are better investigated separately. Frequency of coordination of various structures should not be confused with the number of clauses. Thirdly, there is no more reason to count two coordinated verb phrases as two clauses than to count two coordinated subjects, for instance, as two clauses. Either procedure would be arbitrary and objectionable. Fourth, the present investigators studied coordinations in all verb phrases to see if they could find any statistical justification for assuming that the number of predications was more significant than the number of clauses. They could find no such justification.

In the present study, a different definition of a clause is used, so it should not be surprising that the present study comes to different conclusions about clause length and the subordination ratio.

The LaBrant study has left its mark. In the classic review of the literature, McCarthy recapitulates, "The length of clause [LaBrant] found remains fairly constant in grades 4 to 12, although the subordination index . . . shows an increase. Apparently length of clause is somewhat controlled or restricted by the structure of the language, and whatever increase in sentence length occurs at higher age levels is brought about largely through the addition of more subordinate clauses" (p. 551). Such a view has helped to establish what has been called the "standard procedure." That procedure measures language maturity by means of (1) mean sentence length, (2) subordination ratio, (3) the number of subordinate clauses in each of the conventional three categories.

As will be seen on several different occasions, the findings of this study do not support the widespread view expressed by McCarthy above.

3.6. The Mean Length of Clauses for Three Grades

In counting the number of clauses in the present writings, a clause was taken to be a structure with a subject and a finite verb (a verb with a tense marker). If subjects were coordinated, they merely lengthened the clause, and if any part of the verb phrase was coordinated, that also merely lengthened the clause. The whole thing was counted as one clause.

Once the number of clauses in a student's writing was counted, his total number of words—very close to a thousand—was divided by his total number of clauses to get the mean clause length for that student.

To have tried to count the number of words in each clause by itself would have involved an insoluble complication. For instance, the 8-word sentence "He said I ought to be more careful" contains two clauses, the second being a 6-word noun clause serving as direct object of the transitive verb *said*. How many words does that leave in the main clause? It would be arbitrary to say that the main clause is the remaining 2 words, since no transitive verb like *said* is complete without its direct object. If, on the other hand, we say the main clause is 8 words long, then we will be counting 6 of those words twice. There is no need to make any such arbitrary decision. It is enough to say that the sentence is 8 words long and contains two clauses, so the mean length of the two is 4 words. To get the mean clause length for all the writing by one student, his total number of words was divided by his total number of clauses.

In this fashion the mean clause length was found for each student, each grade, and each sex within grade. The average clause length for all fourth graders was found to be 6.6 words; for eighth graders, 8.1 words; for twelfth graders, 8.6. The differences were found to be significant for sex and grade at the .01 level. (The figures for each individual are shown in Table 4.)

In terms of twelfth grade performance the relative achievement of the three grades was 77 percent, 94 percent, 100 percent. The growth between fourth and eighth grade was considerable, but that between eighth and twelfth was slight.

As Figure 2 indicates, there is considerable overlapping of grades: 15 out of 18 eighth graders overlap twelfth graders.

Table 4 — Mean Length of All Clauses

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Mean length all clauses*	*Student number*	*Mean length all clauses*	*Student number*	*Mean length all clauses*
Boys		*Boys*		*Boys*	
4-1	7.1	8-1	7.9	12-1	9.5
4-2	6.2	8-2	8.8	12-2	9.4
4-3	7.5	8-3	8.9	12-3	7.5
4-4	6.6	8-4	9.4	12-4	8.7
4-5	6.2	8-5	8.3	12-5	10.3
4-6	6.4	8-6	9.0	12-6	9.4
4-7	6.7	8-7	8.5	12-7	11.0
4-8	6.3	8-8	6.9	12-8	9.6
4-9	6.7	8-9	9.2	12-9	7.8
Group mean	6.6	Group mean	8.3	Group mean	9.1
Girls		*Girls*		*Girls*	
4-10	6.2	8-10	7.6	12-10	7.6
4-11	6.6	8-11	6.9	12-11	7.6
4-12	6.9	8-12	9.3	12-12	7.7
4-13	6.4	8-13	8.2	12-13	8.0
4-14	6.4	8-14	7.7	12-14	8.7
4-15	7.5	8-15	7.2	12-15	8.1
4-16	6.4	8-16	7.8	12-16	8.9
4-17	6.5	8-17	7.8	12-17	7.5
4-18	6.6	8-18	8.9	12-18	7.5
Group mean	6.6	Group mean	7.9	Group mean	7.9
Grade mean	6.6 77%	Grade mean	8.1 94%	Grade mean	8.6 100%

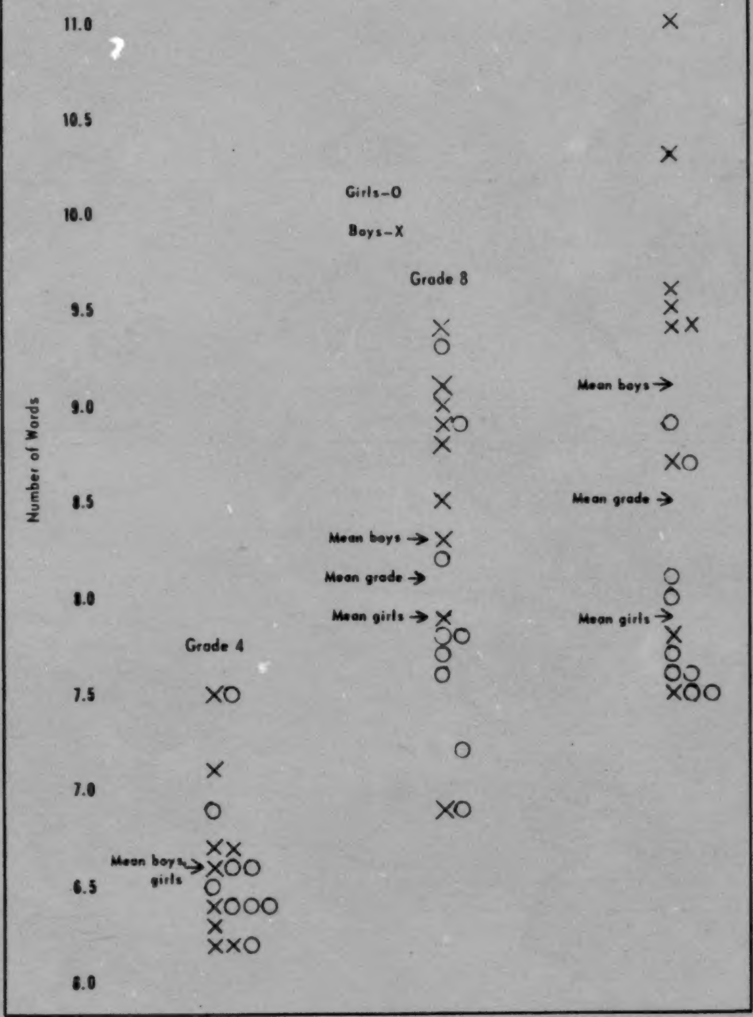
As a result of an analysis of variance, 2 x 3 factorial, the significance for sex and grade was found to be at the .01 level.

3-7. The Ratio of Subordinate Clauses for Three Grades

It is common in language development studies to compute the ratio of subordinate clauses to all clauses both subordinate and main. That ratio was figured here for each student, each grade, and each sex within grade.

As before, clauses were considered to be those expressions that contain a subject (or coordinated subjects) and a finite verb (or coordinated finite verbs). The distinction between main clauses and subordinate clauses was made on a formal basis to be discussed later in the chapter on subordinate clauses.

Figure 2
Mean Clause Length



The frequency of subordinate clauses to all clauses, both subordinate and main, was found to increase from grade to grade. The ratio is, for fourth, 22.2 percent; for eighth, 28.8 percent; for twelfth, 40.1 percent. The differences in individual scores are significant for grade at the .01 level and for the interaction of sex and grade at the .05 level. (The figures for each individual are shown in Table 5.)

Table 5 — Ratio of Subordinate Clauses Divided by All Clauses

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Ratio in %*	*Student number*	*Ratio in %*	*Student number*	*Ratio in %*
Boys		*Boys*		*Boys*	
4-1	7.9	8-1	27.6	12-1	39.6
4-2	31.3	8-2	16.6	12-2	36.5
4-3	14.2	8-3	23.3	12-3	42.5
4-4	9.8	8-4	19.6	12-4	42.1
4-5	19.9	8-5	18.5	12-5	41.7
4-6	22.9	8-6	35.4	12-6	44.6
4-7	14.0	8-7	42.9	12-7	47.0
4-8	18.3	8-8	29.0	12-8	37.2
4-9	23.6	8-9	33.3	12-9	45.7
Group mean	18.3	Group mean	27.4	Group mean	41.8
Girls		*Girls*		*Girls*	
4-10	23.0	8-10	25.0	12-10	37.9
4-11	26.5	8-11	36.5	12-11	45.0
4-12	19.2	8-12	32.1	12-12	35.1
4-13	41.0	8-13	35.8	12-13	36.2
4-14	22.8	8-14	32.3	12-14	47.0
4-15	28.2	8-15	24.8	12-15	36.8
4-16	25.0	8-16	28.4	12-16	27.8
4-17	24.5	8-17	27.7	12-17	50.0
4-18	28.1	8-18	28.6	12-18	32.0
Group mean	26.5	Group mean	30.1	Group mean	38.7
Grade mean	22.2	Grade mean	28.8	Grade mean	40.1

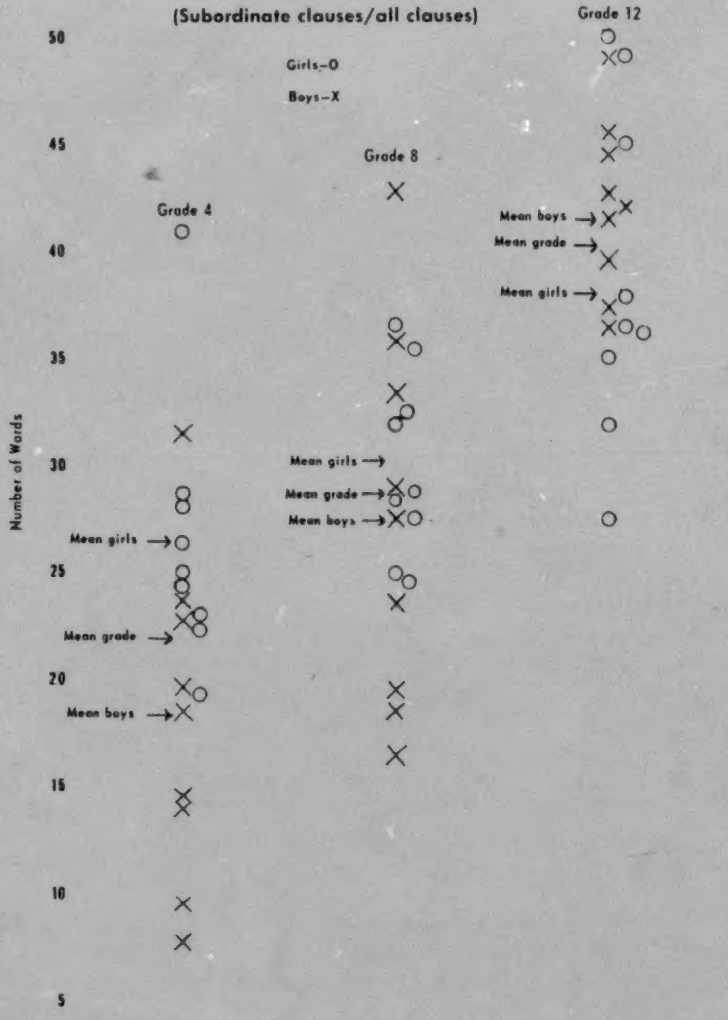
As a result of an analysis of variance, 2 x 3 factorial, the significance was found to be for grade at the .01 level and for interaction of sex and grade at .05 level.

As with clause length, there is here again considerable overlapping of individuals in the three grades. As is shown in Figure 3, 10 out of 18 eighth graders overlap twelfth graders. And 14 out of 18 fourth graders overlap eighth graders.

Figure 3

Subordination Ratio

(Subordinate clauses/all clauses)



3-8. A More Promising Index

The increase in mean clause length and the increase in the number of subordinate clauses add up to something worth noting. If it is true that (1) the average main clause written by successively older students has more subordinate clauses attached to it, and if, in addition, (2) those clauses are longer, then the total length of such a unit would of course increase as a result of the two subsidiary kinds of lengthening. This unit whose total length is being discussed contains, to repeat, one main clause with all the subordinate clauses attached to it. The number of subordinate clauses can, of course, be none.

The length of such a unit might turn out to be a good index of maturity. It might turn out to be an even better index than the two subsidiary factors because of the fact that an individual who was high in subordination index but low in clause length (or the reverse) would have those opposite tendencies moderated by this combining index.

A whole piece of writing could be sliced up into units of this sort, just as a rib pork roast is sliced off into chops. The person slicing need only be careful to cut where the joints come instead of cutting into a chunk of solid bone. There should be no trouble deciding whether an expression, if it is intelligible at all, goes with the preceding main clause or the following. An *and* between two main clauses would always go with the second clause, beginning it just as coordinating conjunctions so often begin the sentences of mature writers. A student's failure to put in periods where he should would not interfere with the slicing process unless the passage already was an unintelligible garble.

Here is a sample to be sliced up. It is printed just as the fourth grader wrote it, except that the spelling is corrected. It is a whole theme, punctuated as one sentence, 68 words long. This one fourth grade sentence is four times as long as the average twelfth grade sentence.

> I like the movie we saw about Moby Dick the white whale the captain said if you can kill the white whale Moby Dick I will give this gold to the one that can do it and it is worth sixteen dollars they tried and tried but while they were trying they killed a whale and used the oil for the lamps they almost caught the white whale

That same theme sliced off into these unnamed units appears below. A capital letter now begins each unit and a period ends each one. A slant line indicates the beginning of each new clause. One unit begins with an *and*, and another with a *but*. Each unit is grammatically capable of being considered a sentence. In fact, these units are the shortest grammatically allowable sentences into which the theme could be segmented. If it were segmented into units any shorter, some fragment would be created.

1. I like the movie / we saw about Moby Dick, the white whale.
2. The captain said / if you can kill the white whale, Moby Dick, / I will give this gold to the one / that can do it.
3. And it is worth sixteen dollars.
4. They tried and tried.
5. But / while they were trying / they killed a whale and used the oil for the lamps.
6. They almost caught the white whale.

As segmented above, several units contain only a single clause—a main clause, of course—like a simple sentence. There are several multi-clause units like complex sentences. In fact, the second unit is rather intricate, for within the main clause is embedded a noun clause and within it is both an adverbial *if* clause and an adjective clause. There are no units like compound sentences or compound-complex sentences, for such units must be cut into two or more parts so that each will contain only one main clause.

These units need a name. It would be simplest to call them "minimal sentences." However, the word "sentence" already has so many different meanings that misunderstanding would be certain to result. The word "sentence" has troubles enough already. A fresh, neutral sounding name would be better. These units might be christened "minimal terminable units," since they would be minimal as to length, and each would be grammatically capable of being terminated with a capital letter and a period. For short, the "minimal terminable unit" might be nicknamed a "T-unit." One would hesitate to use both initials and let it be nicknamed an "M T unit." So "T-unit" will be the name used for it in this investigation.

As a potential index of maturity, the unit has the advantage of preserving all the subordination achieved by a student, and all of his coordination between words and phrases and subordinate clauses.

Slicing a theme into these units does destroy the student's coordination between main clauses, or, more accurately, between T-units, as in numbers 3 and 5 in the theme above. But to do so is a gain rather than a loss, if one is searching for an index of maturity. For it has already been shown that certain fourth graders destroy the significance of sentence length by their tendency to string T-units together endlessly with *and* after *and*, forgetting to use periods. In fact, coordination with *and* between T-units is an index of *im*maturity significant for grade at the .01 level. So such destruction is merciful.

In anticipation of actually testing out this index, we can see that it holds promise.

Any two grammarians should be able to agree on an analysis, whether their denominations be transformational or structural or traditional. The investigators used in this study agreed without exception so long as they were confronted by well-formed sentences either declarative or interrogative.

Table 6 — Mean Length of All T-units

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Mean length all T-units*	*Student number*	*Mean length all T-units*	*Student number*	*Mean length all T-units*
Boys		*Boys*		*Boys*	
4-1	7.8	8-1	10.9	12-1	15.6
4-2	9.0	8-2	10.4	12-2	14.8
4-3	8.7	8-3	11.9	12-3	13.0
4-4	7.2	8-4	11.6	12-4	15.0
4-5	7.8	8-5	10.0	12-5	17.6
4-6	8.3	8-6	14.0	12-6	17.0
4-7	7.8	8-7	14.8	12-7	19.6
4-8	7.7	8-8	9.9	12-8	15.4
4-9	8.7	8-9	10.9	12-9	14.4
Group mean	8.1	Group mean	11.6	Group mean	15.8
Girls		*Girls*		*Girls*	
4-10	8.1	8-10	10.2	12-10	12.2
4-11	9.1	8-11	10.9	12-11	12.5
4-12	8.5	8-12	13.6	12-12	11.9
4-13	10.9	8-13	12.7	12-13	12.5
4-14	8.2	8-14	11.5	12-14	16.5
4-15	10.5	8-15	10.0	12-15	12.8
4-16	8.6	8-16	10.8	12-16	12.3
4-17	8.6	8-17	10.7	12-17	15.0
4-18	9.1	8-18	12.6	12-18	11.0
Group mean	9.0	Group mean	11.4	Group mean	13.0
Grade mean	8.6	Grade mean	11.5	Grade mean	14.4
	60%		80%		100%

As a result of analysis of variance, 2 x 3 factorial, the significance was found to be for grade at .01 level.

3-9. Mean T-unit Length for Three Grades

The writings of all students were cut up into T-units, and the mean length of T-units was computed for each student, each grade, and each sex within grade. The means for each grade were 8.6, 11.5, 14.4. In percentages the increase is from 60 percent to 80 percent to 100 percent. The differences are significant only for grade, and at the .01 level. (The figures for individuals appear in Table 6.)

There is still overlapping between individuals within the grades, as is shown in Figure 4. But with this index there is less overlapping than there is with any of the other indexes which have been employed. The following Table 7 compares the various indexes in this respect.

Table 7—Success of Various Indexes in Separating Grades

	Number of fourth graders overlapping eighth graders	*Number of fourth graders above the mean for eighth graders*	*Number of eighth graders overlapping twelfth graders*	*Number of eighth graders above the mean for twelfth graders*
Sentence length	10	4	14	5
Subordination ratio	14	2	10	1
Clause length	3	0	15	7
T-unit length	2	0	8	1

3-10. The Contingency Coefficients of Four Indexes

The four indexes discussed so far were all tested statistically to determine which was the better indicator of a student's grade level. Each student's score on each index was subjected to a chi-square analysis, and if that was significant at the .05 level, a contingency coefficient was then calculated. Where the chi-square was not found to be statistically significant, that fact is indicated by the initials N. S., and of course no coefficient is given.[2]

The best index is T-unit length (.694). Second best is mean clause length (.616). Third best is subordination ratio (.523). Poorest is sentence length (.489).

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[2] In order to arrive at the division of performance, the distribution scores were divided so that all students with scores equal to or greater than one standard deviation above the mean of the total group distribution were categorized as "high." Those with scores equal to or less than one standard deviation below the mean were categorized as "low." All others were categorized as "average."

All contingency coefficients in this study were computed in this fashion, so all that concern students in the three grades may be compared with each other. In Chapter 4, however, contingency coefficients are computed for a fourth group as well, so coefficients in that chapter are not to be compared with those in other chapters.

Figure 4
Mean Terminable Unit Length

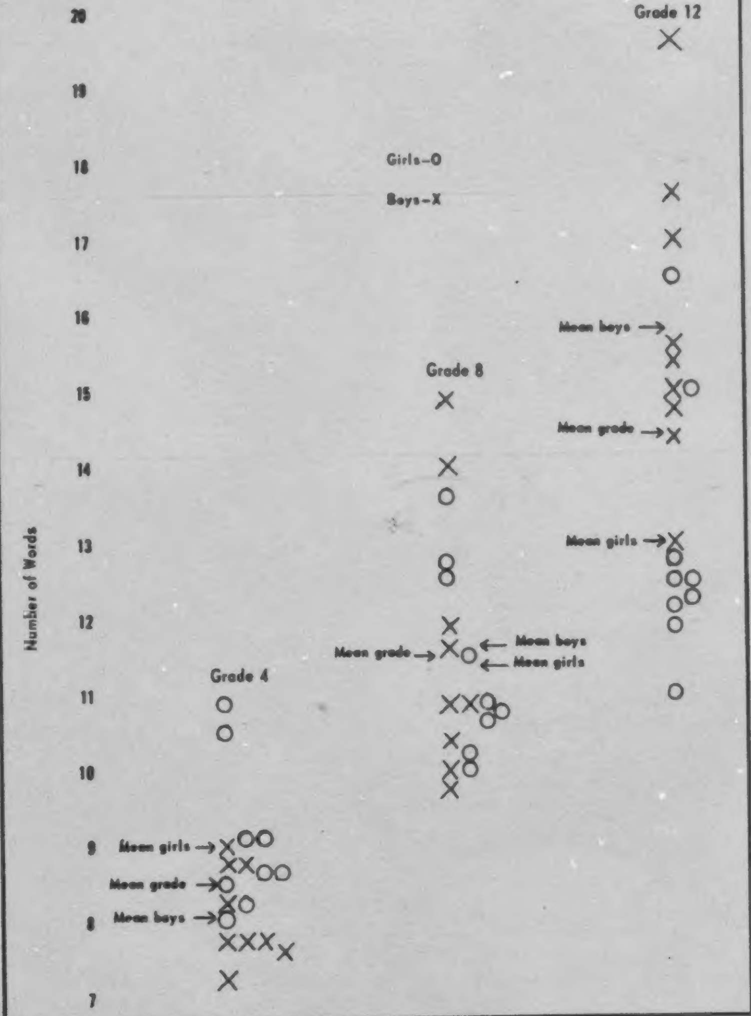


Table 8 — Contingency Coefficients for Four Indexes

	χ^2	*Contingency coefficient*
Mean sentence length	17.03	.489
Subordination ratio	20.30	.523
Mean clause length	33.10	.616
Mean T-unit length	50.35	.694

In the following pages T-unit length will be scrutinized in some detail, since it is a promising index.

3-11. The Distribution of Clauses among Multi-clause T-units

Already we have seen that older students tend to write a higher proportion of subordinate clauses per main clause. That can be restated conveniently by saying that they put more clauses into their T-units. But the mere subordination ratio fails to show us just how large a cluster of clauses each grade prefers to handle, and does handle under extreme circumstances.

Figure 5 gives a profile of how each grade distributes its clauses among single-clause T-units (with only a main clause), 2-clause T-units (with one subordinate clause), 3-clause T-units, 4-clause, etc. For a given grade the height of each bar indicates the percentage of that grade's clauses that appear in T-units of the sort specified. For instance, for fourth graders, the first bar to the left indicates that these students strongly prefer to write single-clause T-units. Almost 60 percent of their clauses appear in such units.

Eighth graders still prefer single-clause T-units, but they use 2-clause T-units (with one subordinate clause) more often than fourth graders do. Twelfth graders have come actually to prefer multi-clause T-units. Forty percent of all their clauses appear in units with more than one. This preference is a little more impressive when we recall that their clauses are longer and hence, presumably, more difficult to combine into complicated units.

These profiles give an interesting elaboration of what the subordination ratio indicated using a single figure for each grade.

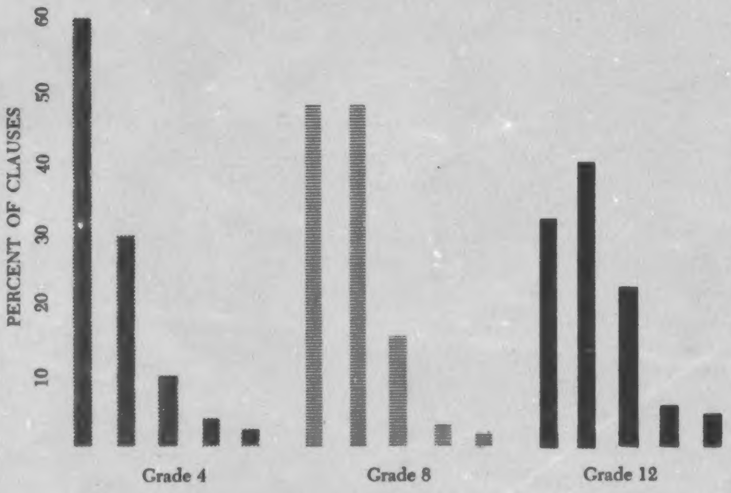
3-12. Depth of Clause Subordination

Depth of clause subordination has been used as an index of maturity, considering a first-order dependency as a dependent clause attached to a main clause, a second-order dependency as a dependent clause attached to a dependent clause attached to a main clause, and

Figure 5

Distribution of Clauses among Multi-clause T-units

1625	clauses	59.2%	in 1-clause T-units
828		30.2%	in 2-clause T-units
240		8.7%	in 3-clause T-units
32		1.2%	in 4-clause T-units
20		.7%	in 5-clause T-units
1080	clauses	48.1%	in 1-clause T-units
796		35.4%	in 2-clause T-units
324		14.4%	in 3-clause T-units
32		1.4%	in 4-clause T-units
15		.7%	in 5-clause T-units
661	clauses	31.0%	in 1-clause T-units
854		40.0%	in 2-clause T-units
447		20.9%	in 3-clause T-units
108		5.1%	in 4-clause T-units
65		3.0%	in 5-clause T-units



a third-order dependency as a dependent clause attached to a subordinate clause of second-order dependency.

On nothing more than chance alone we would predict from the information given in Figure 5 that successively older grades would tend to have more first, second, third, fourth order dependencies.

In each 2-clause T-unit, one clause will inescapably be of first order dependency, and each successively older grade puts a larger proportion of its clauses into such T-units. In each 3-clause T-unit, chance would lead us to expect that the third clause will be attached to the main clause half the time and to the first-order dependent clause half the time. So we would expect half these 3-clause T-units to produce only first-order dependencies, and half to produce one first and one second-order dependency apiece. Again we notice that each older grade puts a larger proportion of its clauses into such T-units. In each 4-clause T-unit—and there are very, very few of these except in twelfth grade writing—the fourth clause can be expected on a basis of chance to produce a third-order dependency only one sixth of the time. Only in T-units containing still larger numbers of T-units can higher dependencies occur, and the likelihood of their occurrence even in such units is very slight.

It seems unlikely that depth of clause subordination will turn out to be as useful an index of maturity as is the information given in Figure 5. For one thing, second- and third- and fourth-dependency clauses are so very infrequent that a vast amount of writing must be covered to find enough of them to provide a statistically significant sample. Furthermore, in T-units containing more than 3 clauses it is possible that all the subordinate clauses are coordinated together. This possibility would reduce still further the frequency of second-order and higher dependencies. Secondly, even when such a sample has been covered, it remains to be seen whether depth of clause subordination is an independent index of maturity or whether it is only a corollary of the kind of information given in Figure 5, and predictable from such information.

Until depth of clause subordination is found to be more significant, it should be superseded by the kind of information given in Figure 5, which is more general, and is immediately relatable to the other factors in T-unit growth.

As a matter of fact, for the small number of instances which appeared in this study, 3-clause T-units for all grades did happen to produce a second-order dependency half (51%) of the time, as would be predicted. The proportion differed from grade to grade (46%, 38%, 62%), but the number of instances is too small to have any statistical significance.

The small number of 4-clause T-units for all grades happened to produce third-order dependencies more often than chance would lead one to expect in a large sample (28% of the time instead of one sixth). Of the eight 4-clause T-units produced by these fourth graders, three happened to produce a third-order dependency, but again these figures have no statistical significance.

Table 9 — Number of T-units Shorter than 9 Words

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Number of T-units*	*Student number*	*Number of T-units*	*Student number*	*Number of T-units*
Boys		*Boys*		*Boys*	
4-1	100	8-1	36	12-1	7
4-2	69	8-2	38	12-2	17
4-3	71	8-3	22	12-3	20
4-4	106	8-4	26	12-4	11
4-5	88	8-5	44	12-5	8
4-6	77	8-6	18	12-6	6
4-7	87	8-7	17	12-7	4
4-8	95	8-8	51	12-8	17
4-9	69	8-9	38	12-9	14
Group total	762	Group total	290	Group total	104
Girls		*Girls*		*Girls*	
4-10	78	8-10	48	12-10	28
4-11	58	8-11	48	12-11	19
4-12	65	8-12	20	12-12	22
4-13	41	8-13	21	12-13	18
4-14	79	8-14	28	12-14	6
4-15	42	8-15	60	12-15	24
4-16	72	8-16	36	12-16	24
4-17	63	8-17	42	12-17	14
4-18	58	8-18	27	12-18	37
Group total	556	Group total	330	Group total	192
Grade total	1318	Grade total	620	Grade total	296

As a result of analysis of variance, 2 x 3 factorial, the significance was found to be for grade at .01 level.

It remains to be seen from a much larger sample whether depth of subordination is a factor of sufficient significance to be useful.

3-13. "Younger Children Write Shorter Sentences"—or, rather, T-units

The layman is likely to hold the opinion that "young children write short sentences, while older children write longer sentences." The layman happens to be right, but with fourth graders writing sentences as long as 60 and 70 words, and with twelfth graders writing sentences as short as 5 and 6, it is unlikely that the layman has actually detected the slight difference in the average. What the layman has probably noticed is T-units rather than sentences, and, furthermore, it is not probably the average length he has noticed so much as the continual recurrence of short T-units.

Anyhow, whether the layman has noticed it or not, the younger student does indeed do a great proportion of his writing in short T-units. A maximum of 8 words (that is, shorter than 9) seems to be a good place to draw the line for "short" T-units.

The fourth graders produce nearly twice as many short T-units (1,318) as eighth graders do (620), and that number is more than twice as many as twelfth graders produce (296) (Table 9).

So typical of grade level is the number of these short T-units, that it provides a better index of grade level than the widely used sentence length. In fact, when the figures presented in Table 9 are subjected to a contingency coefficient analysis such as that discussed earlier, the score is .70 with a chi-square of 52.87. It is as good an indicator of grade as any yet devised.

Another way to present the dominance of short T-units in the writing of young children is to say that 43 percent of all the words expressed by fourth graders are expressed in such units. Less than half that proportion (21%) of the writing of eighth graders appears in such short T-units. Less than half of that figure (10%) of the writing of twelfth graders appears in such short T-units.

These figures are more dramatic than the average T-unit length figure for each grade. To write many short T-units is an unmistakable characteristic of young writers. Of their short T-units, 91 percent are single clauses.

The number of "short" T-units correlates .902 with the average length of T-units for these three grades and has just as high a contingency coefficient. In view of that high correlation, it appears that, for practical purposes, the number of "short" T-units is as good a measure as the average length of T-units. Counting the number of "short" T-units could be recommended as a time-saving procedure if it were not for the fact that the number of words in a passage has to be known whether sentence length, or T-unit length, or only the number of "short" T-units is being found. In comparing the number of "short" T-units among mature writers, it might prove advisable to raise the cutoff point for "short" units 1 or 2 or more words.

Table 10 — Total Number of T-units of Each Length

	Number of occurrences				*Number of occurrences*		
Length in words	*Grade 4*	*Grade 8*	*Grade 12*	*Length in words*	*Grade 4*	*Grade 8*	*Grade 12*
	"*Short*" *T-units*				"*Long*" *T-units*		
1			2	21	9	22	27
2	15	10	6	22	6	19	24
3	109	35	19	23	3	9	34
4	211	74	29	24	3	6	16
5	263	96	41	25	2	15	20
6	262	131	48	26	3	7	18
7	249	133	69	27	2	8	6
8	209	141	82	28		8	5
Subtotal	1318	620	296	29	1	4	4
	445%	209%	100%	30		3	5
				31		4	6
				32		4	4
				33		3	9
				34		1	4
				35	1		2
				36	1	1	1
	"*Middle-length*" *T-units*			37		1	4
9	171	120	96	38			5
10	139	132	91	39			3
11	122	107	76	40		1	2
12	71	85	73	41			1
13	73	91	80	42			1
14	53	59	60	43			1
15	46	69	72	44		1	1
16	35	57	52	46			1
17	22	44	51	53		1	
18	18	44	55	Subtotal	31	118	204
19	16	33	39		15%	58%	100%
20	16	18	31	Total of all T-units	2131	1597	1276
Subtotal	782	859	776		167%	125%	100%
	101%	111%	100%				

3-14. The Frequency of Long and Middle-length T-units

Thus far, the discussion of T-unit length has provided a figure for the average of each grade and has also noted the young child's frequent production of the short T-unit.

To get a fuller picture we can look at Table 10 and Figure 6 which tell how many T-units of each length from shortest to longest are written by the students in each grade.

Calling 1-8 word units "short," 9-20 "middle-length," and more than 20 "long," we can say from Table 10 that all three grades write about the same number of middle-length units, but that fourth graders write more short ones, and twelfth graders write more long ones. We must remember of course that it takes several short ones to make a long one. It takes, at the very least, four 6-word T-units to make one 24-word unit, and it may take several more because of deletion

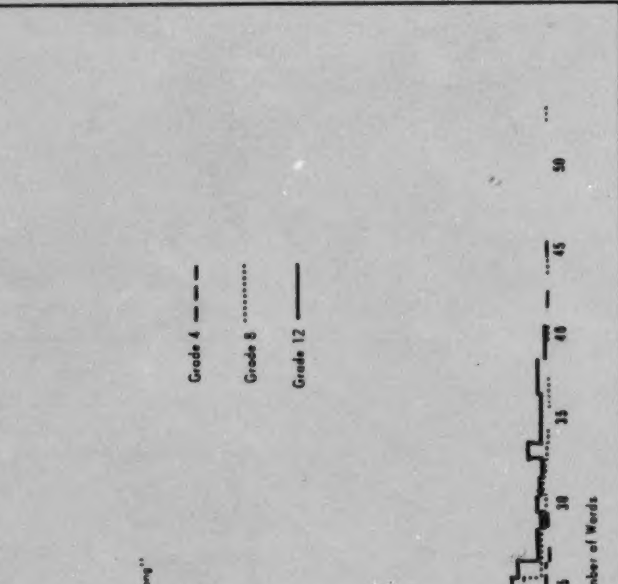
Table 11 — Number of T-units Longer than 20 Words

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Number of T-units*	*Student number*	*Number of T-units*	*Student number*	*Number of T-units*
Boys		*Boys*		*Boys*	
4-1	0	8-1	4	12-1	13
4-2	2	8-2	3	12-2	8
4-3	3	8-3	2	12-3	11
4-4	0	8-4	5	12-4	9
4-5	1	8-5	4	12-5	18
4-6	1	8-6	11	12-6	11
4-7	0	8-7	13	12-7	14
4-8	1	8-8	1	12-8	19
4-9	2	8-9	4	12-9	13
Girls		*Girls*		*Girls*	
4-10	3	8-10	7	12-10	11
4-11	2	8-11	8	12-11	10
4-12	3	8-12	7	12-12	3
4-13	7	8-13	9	12-13	9
4-14	2	8-14	8	12-14	19
4-15	4	8-15	5	12-15	13
4-16	0	8-16	6	12-16	8
4-17	0	8-17	7	12-17	12
4-18	0	8-18	14	12-18	3
Grade total	31	Grade total	118	Grade total	204

Figure 6

Terminable Units of Each Length

(Average number of terminable units, length of T-units)



and consolidation. So, in Figure 6, the high peak at the left in the fourth grade line is absorbed in the faintly thicker and longer tail tapering off to the right in the twelfth grade line.

Long units are, then, as characteristic of twelfth graders as short units are of fourth graders. Twelfth graders write a total of more than six times as many as fourth graders do. The ratio of shorts to longs is, dramatically, 42 to 1 for fourth graders, 5.3 to 1 for eighth graders, and 1.4 to 1 for twelfth graders. (The frequency of long units is reported for each student in Table 11.)

3-15. A New Ratio to Replace the "Subordination Ratio"

Now that the concept of the T-unit has been introduced, it will prove convenient to replace the "subordination ratio" with another measure which gives comparable information in a more widely usable form. The new measure will be the ratio of clauses per T-unit.

The "subordination ratio," devised by LaBrant and used by several more recent investigators, is the number of subordinate clauses divided by the number of all clauses (both subordinate and main). The result is expressed in percent. The new ratio is defined as the number of all clauses (both subordinate and main) divided by the number of T-units—or, since the number of main clauses is identical with the number of T-units, divided by the number of main clauses. The result is expressed as a decimal.

$$\text{“Subordination ratio”} = \frac{\text{subordinate clauses}}{\text{subordinate + main clauses}}$$

$$\text{Ratio of clauses to T-units} = \frac{\text{subordinate + main clauses}}{\text{main clauses}}$$

Obviously an investigator who knew the number of subordinate clauses and also the number of main clauses in a piece of writing could figure either of the two ratios from his information.

One advantage of the new ratio is that it provides an arithmetical bridge for relating clause length to T-unit length. For any body of writing, the average clause length (expressed in words) multiplied by the average number of clauses per T-unit (expressed as a decimal ratio) will exactly equal the average T-unit length (expressed in words).

If any two of those three quantities is known by direct observation, the third can be found by simple computation. Or if all three are found by direct observation, as has been done for this study, then the accuracy of the three figures can be checked one against the others.

For instance, student 4-6, who wrote the long sentence about Moby Dick, had an observed average clause length of 6.4 words (Table 4). He wrote 36 subordinate clauses and 121 main clauses, so his observed ratio of all clauses (157) to T-units (121) can be figured as 1.29 (See Table 12). His observed average T-unit length (Table 6) was 8.3 words. We can easily check the accuracy of these figures: 6.4 words × 1.29 = 8.256 words.

Table 12 — Mean Number of Clauses per T-unit

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Clauses per T-unit*	*Student number*	*Clauses per T-unit*	*Student number*	*Clauses per T-unit*
Boys		*Boys*		*Boys*	
4-1	1.09	8-1	1.38	12-1	1.65
4-2	1.45	8-2	1.18	12-2	1.57
4-3	1.17	8-3	1.33	12-3	1.74
4-4	1.11	8-4	1.24	12-4	1.72
4-5	1.24	8-5	1.22	12-5	1.71
4-6	1.29	8-6	1.56	12-6	1.80
4-7	1.16	8-7	1.75	12-7	1.78
4-8	1.23	8-8	1.41	12-8	1.59
4-9	1.31	8-9	1.50	12-9	1.84
Girls		*Girls*		*Girls*	
4-10	1.29	8-10	1.33	12-10	1.60
4-11	1.36	8-11	1.57	12-11	1.81
4-12	1.23	8-12	1.47	12-12	1.54
4-13	1.69	8-13	1.55	12-13	1.56
4-14	1.29	8-14	1.47	12-14	1.88
4-15	1.39	8-15	1.33	12-15	1.58
4-16	1.33	8-16	1.39	12-16	1.38
4-17	1.32	8-17	1.38	12-17	2.00
4-18	1.39	8-18	1.40	12-18	1.47
Grade mean	1.30	Grade mean	1.42	Grade mean	1.68

The significance was found to be for grade at .01 level and for the interaction of sex and grade at .05 level.

These same relations hold true whether the body of writing is a single sentence, all the writings of a single student, or, if we wish, all the writings by all the students in a certain grade. To say that one figure times the other figure gives the third figure is a mathematical truism.[3]

Not only is the ratio of clauses to T-units a convenient arithmetical bridge, but it also provides by direct inspection an indication of how frequently a subordinate clause was added to a main clause. In each T-unit, one clause is always the main clause, so the ratio, minus one, is the average number of subordinate clauses per main clause.

	Grade 4	*Grade 8*	*Grade 12*
Average number of clauses per T-unit	1.30	1.42	1.68
Average number of subordinate clauses per main clause	.30	.42	.68

Thus, since the ratio number was 1.30 for fourth graders, we can say that 30 percent of the time—less than a third of the time—these fourth graders added a subordinate clause to a main clause.

Since the number is 1.68 for twelfth graders, we can say that 68 percent of the time—two thirds of the time—these twelfth graders added a subordinate clause to a main clause.

This new ratio, like the older "subordination ratio," is an index of maturity significant for grade at the .01 level (and for the interaction of sex and grade at the .05 level). In percentages the increase is from 77 percent to 85 percent to 100 percent. The contingency coefficient is .496. If we chose to use as another index the figures to the right of the decimal in the mean scores, we would get a much more dramatic increase: 44 percent, 62 percent, 100 percent.

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[3] The reader with some mathematical sophistication will want to have one further point cleared up.

In the various tables given for clause length, the ratio of clauses to T-units, T-unit length, sentence length, and, later on, for the ratio of T-units to sentences, the figure given as a grade mean has always been the mean of the scores for the 18 individuals. Suppose we let a score arrived at in this way be called a "first" mean. A "first" mean is not identical with the score we would get if we figured average clause length, etc., for the combined writings of all 18 individuals, considering those writings as a single body. Let us call the score arrived at in this second way the "second" mean. Whether the "second" mean differs from the "first" mean by an appreciable or, instead, a negligible amount depends on whether or not the scores for the individuals vary widely. As it turns out, the variation is slight enough that the difference between "first" mean and "second" mean is negligible (except possibly in the case of sentence length as will be mentioned in a later footnote).

Let us actually compare the "second" means with the "first" means. The total numbers of words written by individuals in the three grades were, respectively 18,111, 18,015, 18,042. The totals for clauses were 2,745, 2,248, 2,135. The totals for T-units (and hence main clauses) were 2,131, 1,607, 1,276. The totals for sentences were 1,468, 1,208, 1,100. From those figures we can get the "second" means to compare with the "first." For clause length, the "second" means are 6.6, 8.1, 8.5; "first" means (Table 4) are 6.6, 8.1, 8.6, negligibly different. For ratio of clauses per T-unit, the "second" means are 1.29, 1.40, 1.67; "first" means (Table 12) are 1.30, 1.42, 1.68, negligibly different. For T-unit length, "second" means are 8.5, 11.3, 14.1; "first" means (Table 6) are 8.6, 11.5, 14.4, negligibly different.

It is a mathematical truism to say for these "second" means that clause length multiplied by the ratio of clauses to T-units gives T-unit length. It is not a mathematical truism, but it is a statistical generalization with only a negligible error to say that the same relationship holds in these materials for "first" means as well.

The ratio of clauses to T-units has already been analyzed further in the section (3-11) on *The Distribution of Clauses among Multiclause T-units.* The analysis will be pushed further in a different direction in the chapter on *Kinds of Subordinate Clauses within T-units.*

In summary, the ratio of clauses to T-units has three uses: first, it provides an arithmetic bridge between clause length and T-unit length; second, it conveniently expresses the frequency with which a subordinate clause is added to a main clause; third, it serves as a significant index of one kind of grammatical development. The name given this ratio is rather cumbersome, and it will be still more awkward after a second ratio is introduced. "Subordination ratio" is much more readable, but since the readable term is fairly widely used already for a different meaning, the cumbersome but explicit label will be continued.

3-16. Two Ways to Lengthen T-units

By employing the ratio explained in the last section, we are now in a position to see whether language development is characterized more prominently by the tendency of older writers to produce longer clauses or by their tendency to produce a larger proportion of subordinate clauses. Taking twelfth grade performance as 100 percent, we can assign percentage values to the achievement of the two younger grades as in Table 13.

Table 13 — Clause-to-T-unit Length Factors

	Average length of clauses		*Ratio of clauses per T-unit*		*Average length of T-units*
Grade 4	6.6 words (77%)	×	1.30 (77%)	=	8.6 words (60%)
Grade 8	8.1 words (94%)	×	1.42 (85%)	=	11.5 words (80%)
Grade 12	8.6 words (100%)	×	1.68 (100%)	=	14.4 words (100%)

Reading percentages down the column for clause length, we see that much of the growth (94% −77% = 17%) occurred in the earlier period, and little (100% −94% = 6%) appeared in the later period. Reading down the second column, indicating the number of subordinate clauses, we see the reverse to be true. Little growth (85% −77% = 8%) occurred in the earlier period and much of the growth (100% −85% = 15%) occurred in the later period.

The investigator is by no means convinced that this difference in these two growth rates is characteristic of all writings by all average school children. However, keeping the two factors separate as is done here enables future investigators to check the existence of this apparent trend.

As it is measured here, the overall growth during the school years from grades 4 to 12 is exactly the same for each of the factors contributing to T-unit length. Clauses are lengthened by the same percentage with which subordinate clauses are added to T-units (from 77% to 100%). This finding will be related, later on, to what has been called "the standard view."

With respect to increase in T-unit length, we see that the early growth in one factor happens, with these students, to supplement exactly the late growth in the other factor so that T-unit length is exactly equal (20% – 20%) for the early and late periods. This helps to explain why, by statistical analysis, the length of T-units is found to be a better index of grade level than is either of the two contributing factors taken separately.

3-17. The Ratio of T-units per Sentence

Early in this chapter we noted the tendency of certain fourth graders to string T-units together almost endlessly with *and's* and other coordinating conjunctions between. The number of coordinating conjunctions used in that way (Table 3) is an adequate index of that tendency. But so far we have no index of the similar tendency of younger students to string T-units together with nothing, or nothing but punctuation, between. We would have a single index of both tendencies if we figured the ratio of T-units per sentence.

That ratio would tell us something about the characteristics of even a mature writer—whether he achieved long sentences by joining many T-units, or whether instead he achieved such length by expanding his T-units.

That ratio would also serve as an arithmetic bridge from T-unit length to sentence length. For any body of writing, mean T-unit length (expressed in words) multiplied by this ratio (expressed as a decimal fraction) would exactly equal mean sentence length (expressed in words).

If any two of those three quantities is known by direct observation, the third can be found by simple computation. Or if all three are found by direct observation, as has been done in this study, then the accuracy of the three figures can be checked one against the other.[4]

For an illustration, let us return to student 4-6 who wrote the long sentence about Moby Dick. He wrote 121 T-units and 41 sentences, so his observed mean ratio of T-units to sentences was 2.951 (Table 14). His observed mean T-unit length (Table 6) was 8.314, and his observed mean sentence length (Table 2) was 24.54. We can easily check the accuracy of those figures: 8.314 words × 2.951 = 24.535 words.

That extremely high ratio figure explains why this student got a sentence length rating that put him up above all twelfth graders. If we look to Table 14, we see that the only writers to compare with him are two other fourth graders who, like him, have not yet learned to group their T-units into sentences of mature proportions.

The differences in individual scores turn out to be significant for grade at the .01 level (and for the interaction of sex and grade at the .05 level). Whereas a high score on every other index considered previously has indicated greater maturity, the reverse is true here. The highest scores all go to the youngest students. (See Figure 7). The means for the grades decline, as do the medians. The means (Table 14) are 1.60, 1.37, 1.17. In percentages the decline is from 137 percent, to 117 percent, to 100 percent. However, the chi-square scores are not significant at even the .05 level, so this ratio does not prove to be a significant index of maturity—or of immaturity, however useful it may be in describing the characteristics of a writer.

Just as the earlier ratio of clauses to T-units could be thought of

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[4] The questions raised in the previous footnote apply here, of course, too. In Table 14 the mean for the 18 individual scores on the ratio of T-units to sentences for each grade is given as 1.60, 1.37, 1.17. The corresponding "second" means, obtained from the figures given in the previous footnote by treating all the writings in one grade as a single body, are 1.45, 1.33, 1.16. Again the differences are slight. In Table 2 the mean of the 18 sentence length scores for each grade is 13.5, 15.9, 16.9. The "second" means for sentence length are 12.3, 15.0, 16.4. Here the difference between the two sets of means is greater than it was elsewhere, because the variation from one individual to another is wider, especially among the two earlier grades, as was noted earlier in this chapter.

The mathematical truism still applies, of course, to these "second means," but the reader may decide for himself whether or not he cares to call negligible the difference between the two means for sentence length.

Table 14 – Number of T-units per Sentence

Grade 4		*Grade 8*		*Grade 12*	
Student number	*T-units per sentence*	*Student number*	*T-units per sentence*	*Student number*	*T-units per sentence*
Boys		*Boys*		*Boys*	
4-1	1.54	8-1	1.17	12-1	1.16
4-2	1.45	8-2	1.14	12-2	1.01
4-3	1.39	8-3	1.04	12-3	1.04
4-4	2.94	8-4	1.16	12-4	1.27
4-5	1.37	8-5	1.55	12-5	1.30
4-6	2.95	8-6	2.15	12-6	1.16
4-7	1.39	8-7	1.31	12-7	1.06
4-8	2.98	8-8	1.12	12-8	1.05
4-9	1.18	8-9	2.00	12-9	1.04
Girls		*Girls*		*Girls*	
4-10	1.32	8-10	1.43	12-10	1.32
4-11	1.07	8-11	1.70	12-11	1.50
4-12	1.15	8-12	1.23	12-12	1.10
4-13	1.29	8-13	1.07	12-13	1.07
4-14	1.18	8-14	1.49	12-14	1.22
4-15	1.63	8-15	1.38	12-15	1.07
4-16	1.56	8-16	1.26	12-16	1.20
4-17	1.08	8-17	1.25	12-17	1.21
4-18	1.25	8-18	1.23	12-18	1.20
Grade average	1.60	Grade average	1.37	Grade average	1.17
	137%		117%		100%

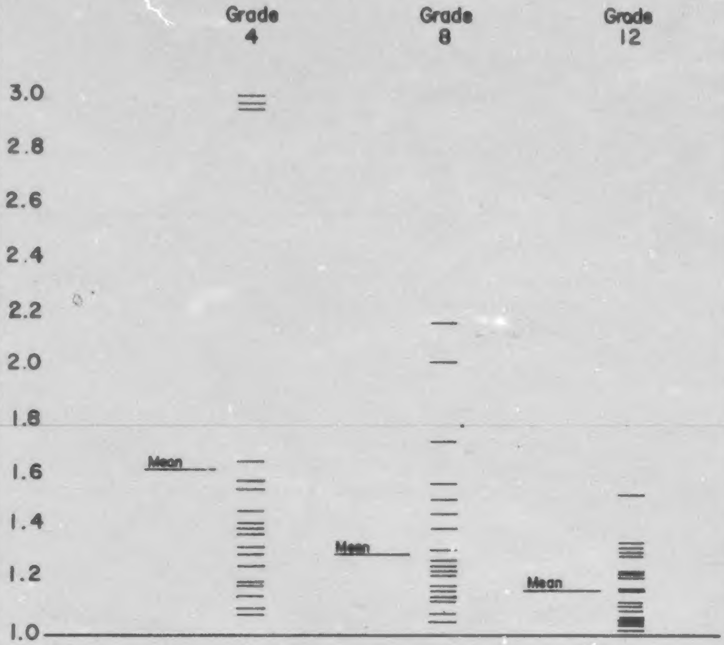
The significance was found to be for grade at .01 level and for the interaction of sex and grade at the .05 level.

as indicating how often clauses are subordinated, so this ratio can be thought of as indicating how often main clauses (or, more accurately, T-units) are coordinated–unless one objects to calling "run-on" sentences and "fused" sentences coordinated. Like the other ratio, this never has a value smaller than one. This ratio–minus one–indicates the average frequency with which other T-units are added to the first one in each sentence.

Thus, the mean ratio of 1.60 for fourth graders means that they put a second T-unit into their sentences 60 percent of the time. A ratio of 1.17 for twelfth graders indicates that they did so only 17 percent of the time–a third as often. As with the other ratio, so here too we could get more dramatic figures if we chose as our index one less than the value for the ratio, as has just been done. Then we could say that the decrease was from 353 percent to 217 percent to 100 percent.

Figure 7

Ratio of T-units per Sentence



In summary, the ratio of T-units to sentences has at least two uses: first, it provides a single measure of a writer's tendency to join T-units together into sentences with coordinating conjunctions, or punctuation, or nothing between. Second, it provides an arithmetical bridge between T-unit length and sentence length, thus completing a set of arithmetical steps that relate clause length to sentence length.

The name of this ratio is cumbersome, especially when this ratio must be distinguished from the one discussed two sections earlier. Just as "subordination ratio" would be a more readable name for that one, so "coordination ratio" would be more a readable name for this one. Or the earlier ratio might be called "Ratio 1" and this "Ratio 2." However, in this discussion the more cumbersome but also more explicit name will generally be used, simply because it is less likely to be misunderstood.

This ratio is capable of further analysis in various directions. For instance, it would be possible to study the frequency with which coordinating conjunctions, certain marks of punctuation, or no marks appear between T-units. Only the frequency of conjunctions has been reported for these three grades earlier in this chapter. In the next chapter a fuller report of this sort will be given for twelfth graders and superior adults.

3-18. The Distribution of T-units among Multi-T-unit Sentences

Another direction for more detailed analysis is to see how often each grade joins two, three, four, five and even six and more T-units into a single sentence. That information is presented in Table 15.

This picture is quite opposite from that we got in an earlier figure (Figure 5) where we saw in a series of bars that older students produce more T-units with larger numbers of clauses in them. Here we see that it is the younger students who produce more sentences with larger numbers of T-units in them. Older students characteristically produce one T-unit per sentence. Three fourths of their T-units are in such sentences. Actually, four out of eighteen fourth graders and three out of eighteen eighth graders were responsible for practically all of the sentences that contained more than four T-units. Twelfth graders don't do that sort of thing.

It is indeed true that T-units may be grouped judiciously into sentences by a skilful stylist using either coordinating words or marks of punctuation. But the same devices can be used with great abandon

Table 15 — Distribution of T-units among Multi-T-unit Sentences

	Sentences containing the following number of T-units							
	1	*2*	*3*	*4*	*5*	*6*	*No. T-units contained in other sentences*	*Total no. of T-units*
No. sentences								
No. T-units in such sentences	1052	288	66	27	5	6	7, 9, 9, 10, 10,	
% of all T-units	1052	576	132	108	25	36	11, 12, 13, 17	2027
Grade 4							Total 98	
in such sentences	51.9%	28.4%	6.5%	5.3%	1.2%	1.8%	4.8%	100%
Grade 8								
No. sentences	928	218	32	14	8	3	8, 8, 8	
No. T-units in such sentences	928	436	96	56	40	18	Total 24	1598
% of all T-units								
in such sentences	58.1%	27.3%	6.0%	3.5%	2.5%	1.1%	1.5%	100%
Grade 12								
No. sentences	909	165	11	1	—	—		
No. T-units in such sentences	909	330	33	4	—	—		1276
% of all T-units								
in such sentences	71.2%	25.9%	2.6%	.3%	—	—		100%

by the least skilled. Merely quantifying methods such as those used in this study cannot separate the skilful from the skilless occurrences. (See Hemingway's exceptional usage in 4-12.)

3-19. Two Ways to Lengthen Sentences

In a developmental study it is advantageous to keep separate the two factors which contribute to sentence length, namely the length of T-units and the ratio of T-units per sentence. By doing so, and noting the change from grade to grade, it is possible to make certain observations about the effect of the two. These factors can be succinctly presented in tabular form. (See Table 16.)

Table 16 — T-unit-to-Sentence Length Factors

	Average T-unit length		*Ratio of T-units per sentence*		*Average sentence length*
Grade 4	8.6 words	×	1.60	=	13.5 words
	(60%)		(137%)		(80%)
Grade 8	11.5 words	×	1.37	=	15.9 words
	(80%)		(117%)		(94%)
Grade 12	14.4 words	×	1.17	=	16.9 words
	(100%)		(100%)		(100%)

Reading percentages down the first column, for T-unit length, we see a steady increase. Reading percentages down the second column, for T-units per sentence, we see a steady decrease. Again reading percentages, this time down the third column, for sentence length, we see an increase, but less than occurred in the first column.

This means that the increase in the first column was strong enough to more than offset the decrease in the second column, consequently producing an increase in the third. In other words, if T-unit length had remained the same, say at 8 words for each grade, sentences would have got shorter rather than longer in successively older grades.

Thus we see why sentence length for these grades is no better as an index of maturity. At the same time we see why it is as good an index as it is. It gets its strength from the increase in T-unit length. It gets its weakness from the ratio of T-units to punctuated sentences. T-unit length increases 40 percent during these school years. Sentence length increases only 20 percent, about half as much.

3-20. A Synopsis of Clause-to-Sentence Factors

Using the concept of the minimal terminable unit as a significant grammatical unit intervening in size between the clause and the sentence, we have been able to differentiate five factors useful to a more refined understanding of sentence development. All five can be synopsized in a simple table. The first column, the middle column, and the last have to do with the lengths (measured in words) of clauses, T-units, and sentences. Between those columns are the ratios which lead, by simple multiplication, from one column to the next. Below each figure is the percentage of twelfth grade accomplishment. Across the bottom is the statistical significance of the several columns.

There is no need to recapitulate the interpretation which can be extracted from such a synopsis and which has already been given in two separate stages. However, it might be noticed that, of all five factors, the one which shows the greatest percentage growth is T-unit length, in the middle column. It also is statistically the best indicator of grade level. (See Table 17.)

3-21. The Intercorrelation of the Five Synopsis Factors

The intercorrelations of the five Synopsis factors will interest the research investigator, though they may not interest the general reader, unless he is concerned with the achievement of individuals at a particular grade level.

In Table 18 correlations between the factors are given separately for the 18 individuals in each grade (G4, G8, G12) and then for all 54 individuals (All G). Correlations that are not significant at the .05 level are omitted.

1. T-unit length, which is the product of clause length multiplied by ratio 1, is highly correlated with ratio 1 at G4, but at that level is not related to clause length. However, at G8 it is related to both, though still more highly to the ratio. At G12 it is related to both, and, by this time, more highly to clause length than to the ratio.

This suggests that in the early grades one of the two factors contributing to T-unit length may turn out to be a better index of individual achievement than T-unit length itself. In other words, fourth graders lengthen their clauses so very little beyond the minimum, using the devices to be discussed in the latter chapters of this study, that any individual differences among them in this regard do not show up in T-unit length. Instead, clause length differences are completely overshadowed by differences in the number of these clauses, short at

Table 17 — A Synopsis of Clause-to-Sentence Factors[5]

	Average length of clauses	*Ratio of clauses per T-unit*	*Average length of T-units*	*Ratio of T-units per sentence*	*Average length of sentences*
Grade 4	6.6 words × 77%	1.30 = 77%	8.6 words × 60%	1.60 = 137%	13.5 words 80%
Grade 8	8.1 words × 94%	1.42 = 85%	11.5 words × 80%	1.37 = 117%	15.9 words 94%
Grade 12	8.6 words × 100%	1.68 = 100%	14.4 words × 100%	1.17 = 100%	16.9 words 100%
Statistical significance for 3 grades and both sexes by analysis of variance, 2 × 3 factorial	for grade at .01 level, and for sex at .01 level	for grade at .01 level, and for interaction of sex and grade at .05 level	for grade at .01 level	for grade at .01 level, for interaction of sex and grade at .05 level	for sex at .05 level and for grade at .05 level
Contingency coefficient	.616	.496	.694	N.S.	.489

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[5] In this table the values given with multiplication and equality signs between are the means of the individual scores as given in the previous tables. In the third column the actual products obtained by multiplying the values given in the first two columns would be 8.58, 11.52, 14.48, insignificantly different. In the fifth column the actual products obtained by multiplying the values given in the third and fourth columns would be 13.76, 15.76, 16.85, insignificantly different.

Table continued on page 46.

Table 17—Continued

A synopsis of Clause-to-Sentence Factors showing what have been called in the previous footnotes the "second" means, that is, the means obtained by treating all the writings from a single grade as one single body of writing is given below. Either version of the Synopsis could be used.

Synopsis Using Observed "Second" Means

	Clause length		*Ratio*		*T-unit length*		*Ratio*		*Sentence length*
Grade 4									
Observed values	6.6		1.29		8.5		1.45		12.3
	78%		77%		60%		125%		75%
Arithmetical products	6.6	×	1.29	=	8.514	×	1.45	=	12.345
Grade 8									
Observed values	8.1		1.40		11.3		1.33		15.0
	95%		84%		80%		115%		91%
Arithmetical products	8.1	×	1.40	=	11.34	×	1.33	=	15.082
Grade 12									
Observed values	8.5		1.67		14.1		1.16		16.4
	100%		100%		100%		100%		100%
Arithmetical products	8.5	×	1.67	=	14.195	×	1.16	=	16.466

Table 18 — Intercorrelation of Synopsis Factors

	Ratio of clauses to T-units (Ratio 1)	*T-unit length*	*Ratio of T-units to sentences (Ratio 2)*	*Sentence length*
Clause length	All G .436	G8, .544 G12, .831 All G .836	All G -.301	G12, .540 All G .4288
Ratio of clauses to T-units (Ratio 1)		G4, .850 G8, .683 G12, .538 All G .831	All G -.315	G8, .578 G12, .579 All G .4287
T-unit length			All G -.381	G8, .560 G12, .722 All G .483
Ratio of T-units to sentences (Ratio 2)				G4, .961 G8, .875 G12, .589 All G .591

best, which are combined into T-units.

Taking all individuals together, however, T-unit length is equally highly correlated with both its contributing factors.

2. At every grade level the two factors contributing to T-unit length are unrelated to each other. Taking all individuals together, however, they are related significantly.

3. At no grade level does ratio 2 correlate significantly with any other factor except sentence length, which it helps determine. It bears only a chance relationship to the others. However, taking all individuals together, this ratio does correlate, though negatively, with T-unit length and its components, thus supporting the previous evidence that over the years a high score on this factor indicates immaturity, though for any grade level it is not related even negatively to maturity—it is only an irrelevant, a chance factor.

4. Sentence length can be regarded either as the product of ratio 2 and T-unit length, or, skipping T-unit length, as the product of ratio 2, ratio 1, and clause length.

At G4, sentence length correlates extremely highly (.961) with ratio 2, but with no other factor. This fact supports the previous evidence that sentence length, at least in the early grades, is no index of maturity, though over a long span of years it does have a significant contingency coefficient.

At G8 sentence length still does not correlate with clause length, but it does with the other factors, and it still is strongly related (.875) with ratio 2.

At G12 sentence length correlates with all other factors, and now less highly with ratio 2 than with T-unit length.

Taking all individuals as a group, sentence length correlates significantly with every other factor, though more highly with ratio 2 than with any other.

3-22. A Reappraisal of an Established Opinion

Using the information contained in the Synopsis of Clause-to-Sentence Factors, it is now possible for us to reappraise the discussion of sentence development as it was set forth by McCarthy ten years ago in a classic and influential passage. The sentences quoted here are consecutive (pp. 550-551) but are separated to allow comment on each.

1. "Apparently, then, sentence length is a measure which continues to show increase in normal children until maturity. The use of the measure has been criticized by some writers, and a few substitute measures have been suggested, but none seems to have superseded the mean length of sentence for a reliable, easily determined, objective, quantitative, and easily understood measure of linguistic maturity."

Comment: Sentence length is indeed a significant index of maturity, but it is statistically less significant than at least three others which have been examined so far in this study. Any competent grammarian should find T-unit length or clause length or subordination ratio to be "objective," "quantitative," and "reliable," though indeed not so "easily determined" as sentence length. It is time for sentence length to be superseded.

2. "The length of clause [LaBrant] found remains fairly constant in grades 4 to 12, although the subordination index, or ratio of subordinate to coordinate (main) clauses, shows an increase."

Comment: From grades 4 to 12 the percentage growth in clause length happens here to be exactly the same as that in number of clauses per T-unit, taking twelfth grade performance as 100 percent. Furthermore, there is no distinguishable difference between the correlation of sentence length with clause length (.4288) and of sentence length with the ratio of clauses per T-unit (.4287), taking all 54 individuals together.

It would, of course, be possible to devise a unit which would make the increase in number of subordinate clauses look rather dramatic. Such a unit has, in fact, been suggested in the section (3-15) on the *A New Ratio to Replace the "Subordination Ratio."* However, a measure could be devised which would show a dramatic increase in clause length too, if doing so would serve any useful purpose. In other words, the investigator may choose a unit which will "prove," at least superficially, whatever he wants to prove.

3. "Apparently length of clause is somewhat controlled or restricted by the structure of the language, and whatever increase in sentence length occurs at higher age levels is brought about largely through the addition of more subordinate clauses."

Comment: The length of clause appears not to be controlled or restricted by the structure of the language. The addition of more subordinate clauses is not "largely" responsible for the increase in sentence length: as item 2 indicated above, one of the two factors seems to contribute just as much as the other.

Whether the tendencies summarized in the Synopsis above continue into maturity or whether some or all of them reach their virtual limits in the writings of average twelfth graders remains to be discovered by other research. Some of that research will be mentioned in the following chapter.

3-23. A Summary of the Clause-to-Sentence Findings

1. The present chapter introduced the concept of the "minimal terminable unit," a grammatically discrete unit intervening in size between the clause and what is punctuated as a sentence. The minimal terminable unit, or T-unit, was defined as one main clause plus the subordinate clauses attached to or embedded within it.

2. The mean length of clauses and of T-units and of punctuated sentences was found for each student, each grade, and each sex within grade. A clause was defined as a structure containing a subject (or coordinated subjects) and a finite verb phrase (or coordinated verbs or phrases). The length of a single clause cannot always be counted, inasmuch as a noun clause, for instance, is regularly part of another clause; but the number of clauses (both main and subordinate) can be counted. The total number of words divided by the total number of clauses was reported as the mean clause length for each student, etc. The punctuated sentence was here defined as the words written between a capital letter and a period or other terminal punctuation.

3. In addition to the three mean lengths, two ratios were figured for each student, each grade, and each sex within grade. One ratio was the mean number of clauses per T-unit. The other was the mean number of T-units per punctuated sentence.

4. For each student, the three lengths plus the two ratios were subjected to a statistical analysis of variance, 2 × 3 factorial, for sex and grade and interaction of sex and grade. They were also tested using the contingency coefficient technique (section 3-10) to determine which was the better indicator of a student's grade level.

The results for each grade are all presented in the following synopsis of clause-to-sentence factors (Table 19).

The contingency coefficient scores indicate that, from grades 4 to 12, T-unit length is the best index of grade level, that clause length is next best, that the ratio of clauses to T-units is next best, and that punctuated sentence length is the least adequate. The ratio of T-units to sentences has a chi-square that is not significant even at the .05 level. The ratio of T-units to sentences tends to decline from grade to grade, whereas all the other index scores increase. The high mean scores in the early grades are due to the tendency of certain individuals to string many T-units together with *and*'s, or punctuation, or nothing between.

5. The synopsis also indicates that (a) in the earlier period the mean clause length increases more than it does in the later period; (b) in the earlier period the proportion of subordinate clauses increases less than it does in the later period; (c) these two gains produce the gain in average T-unit length, which is thus smoothed out to be equal for the two periods; (d) much of the gain in T-unit length is counteracted before it is carried forward to increase mean sentence length. This counteraction is caused by the decline in average number of T-units per sentence.

6. The ratio of clauses to T-units was examined in greater detail by noting the number of clauses each grade put into one-clause T-units, two-clause T-units, three-, etc. (3-12).

The ratio of subordinate clauses per main clause, or per T-unit, is always 1 less than the ratio of clauses per T-unit. In chapter 5 the ratio of subordinate clauses per T-unit will be broken down further into the number of adjective, movable adverb, noun, and other subordinate clauses per T-unit, for each grade.

7. The ratio of T-units to sentences was also examined in greater

Table 19 — A Synopsis of Clause-to-Sentence Factors

	Average length of clauses	*Ratio of clauses per T-unit*	*Average length of T-units*	*Ratio of T-units per sentence*	*Average length of sentences*
Grade 4	6.6 words × 77%	1.30 = 77%	8.6 words × 60%	1.60 = 137%	13.5 words 80%
Grade 8	8.1 words × 94%	1.42 = 85%	11.5 words × 80%	1.37 = 117%	15.9 words 94%
Grade 12	8.6 words × 100%	1.68 = 100%	14.4 words × 100%	1.17 = 100%	16.9 words 100%
Statistical significance for 3 grades and both sexes by analysis of variance, 2 × 3 factorial	for grade at .01 level, and for sex at .01 level	for grade at .01 level, and for interaction of sex and grade at .05 level	for grade at .01 level	for grade at .01 level, for interaction of sex and grade at .05 level	for sex at .05 level and for grade at .05 level
Contingency Coefficient	.616	.496	.694	N.S.	.489

detail by noting the number of T-units each grade put into one-T-unit sentences, two-T-unit sentences, three-, etc. (3-18).

This ratio is capable of additional breakdown by noting what stands between each T-unit in a sentence: whether it is a coordinating conjunction (and which one), or punctuation alone, etc. This breakdown for the three grades is not fully reported, though it was made. Only the number of coordinating conjunctions, and which ones, has been reported. Compared with twelfth graders, fourth graders use more than three times as many coordinating conjunctions, and nearly five times as many *and*'s.

8. T-unit length was examined in considerable detail, giving, for each grade, the number of T-units of each length from shortest to longest. This information was presented in Table 10 and in a revealing graph (Figure 6).

All grades write about the same number of middle length T-units (9-20 words), but fourth graders are characterized by a great number of short units (1-8 words) and twelfth graders by a considerable number of long ones (above 20 words).

The amount of writing done in "short" T-units is a highly significant index of maturity. It has a chi-square of 52.87 and a contingency coefficient of .70, even slightly higher than that for T-unit length.

The amount of writing done by each grade in "short" T-units is 43 percent, 21 percent, 10 percent of all the writing done by that grade. The percentage is halved by each successively older grade. More than nine times out of ten, "short" T-units are single clauses: main or independent clauses, of course, with no subordinate clause attached.

This more elaborate analysis of T-unit length adds a significant piece of information to the increase in mean length from grade to grade: namely, that the increase is due to a major reduction in the number of very short T-units, which are usually single independent clauses, and a corresponding increase in long units, with only a relatively minor change in middle length units.

9. The synopsis of clause-to-sentence length factors provides the first stages of an analysis which is systematic, coherent, broad, yet capable of sufficient refinement to incorporate details. It is an "outside" analysis so far—outside the clause.

The next two chapters continue the "outside" analysis, but the chapters following those look inside the clause.

This whole study takes shape if we think of a T-unit as consisting of a single short independent clause capable of expansion at any of several points, and, in fact, actually expanded and lengthened in the hands of all writers, but expanded more often and to a greater extent by older writers.

The single short independent clause must contain certain essential elements: a subject nominal, a finite verb or verb phrase, and, depending on the verb, certain objects, complements, etc. Only that much is essential in order for a clause to be grammatical English. However, other elements may optionally be added. Modifiers may be added, and the auxiliary to the verb phrase may be expanded. In fact, clauses can be embedded in this clause. Elements may be added by coordination. Each added optional element increases the length of the original T-unit until it is no longer a single short clause.

Already we see that older students write longer T-units. That can only mean that they characteristically add more of these optional elements. Some of these optional elements are clauses, some are not. The nonclause elements will explain the increase in clause length. The increase in both clauses and nonclauses together explains the increase in T-unit length.

CHAPTER 4. FINDINGS: THE CLAUSE-TO-SENTENCE FACTORS IN WRITINGS BY SUPERIOR ADULTS

4-1. The Purpose of This Chapter

The teacher who looks at developmental trends which stop with the achievement of average twelfth graders has a sense of incompleteness. How much farther will these writers go? How far away, with respect to these trends, are they from superior writers?

This chapter will not tell how far these students are from the peak of their own achievement. But it will tell how far they are, in certain respects, from writers who are indubitably good.

A body of superior nonfiction will be examined. Nonfiction does not mean nonnarrative, of course. Narrative appears in exposition, whether a *Harper's* and *Atlantic* "article," or a schoolchild's account of what he wants to be when he gets out of school, or a study of the revenge motif in *Macbeth*.

Mature fiction is quite different from a schoolchild's narrative. A master, or even a skilled professional, may use very special devices to achieve very special effects. Just to glance quickly at how mature fiction compares with the writing of schoolchildren, in these externals, three stories will be examined at the end of the chapter.

Mature nonfiction is selected on the grounds that it is closer to what schoolchildren write than is mature fiction. To prove such an assumption would call for a separate study.

4-2. The Writing Sample

When the study of the writings of average school children was completed, a further study of certain articles from *Harper's* and *Atlantic* magazines was begun. The articles were all from the January, February, and March, 1964, issues. All articles were primarily expository; none were fiction, but as every writing teacher knows, expository writing often employs some narration to make a point.

The passage selected from each article was the first thousand words. In each instance that sample appeared to be typical of the whole article.

In order to make the figures easily comparable to those for the students, eighteen samples were chosen, nine from *Harper's* and nine from *Atlantic*, thus providing a total of 18,000 words, the same amount written by students in each of the grades.

4-3. These Writers as "Superior Adults"

The *Harper's* and *Atlantic* writers differ from average schoolchildren in more ways than age alone. One might suppose they had probably possessed superior ability even when they were schoolchildren. Perhaps too they were especially strongly motivated to become writers. They may or may not have had especially wise instruction. Probably, too, the published writings were revised far more carefully than the writings of average school children. Certainly the writings were edited if they needed editing. The magazine article writers are not, then, mere average school children grown older. Any of several variables may contribute to the differences in their writings. Two of those variables will be kept in mind if we speak of them as "superior adults." Their writing is unquestionably superior.

Though this fourth group differs from average school children in several respects, a comparison between the groups has a definite value. A writing teacher might very properly consider the writing of these superior adults a target for less accomplished persons to aim toward. At least their writings may indicate whether the trends observed in schoolchildren continue further. Statistically this fourth group will be presented as a fourth stage in a continuum. But of course that does not mean that this step is the same size as the other steps, or in exactly the same direction.

4-4. A Synopsis of Clause-to-Sentence Factors for Four Groups

Having developed in the previous chapter a synopsis of the various clause-to-sentence factors, we can now present the data for this fourth group more succinctly than could have been done before. It is convenient still to keep the twelfth grade achievement as 100 percent in Table 20.

The percentages across the bottom line allow us to compare the performance of these superior adults and that of these average twelfth graders. However, those percentages must not be misinterpreted. For instance, the biggest gain over twelfth graders is in sentence length: 47 percent. But the synopsis enables us to compare the relative strengths of the factors which produce this gain.

Table 20—A Synopsis of Clause-to-Sentence Factors for Four Groups[1]

	Average length of clauses		*Ratio of clauses per T-unit*		*Average length of T-units*		*Ratio of T-units per sentence*		*Average length of sentences*
Grade 4	6.6 words 77%	×	1.30 77%	=	8.6 words 60%	×	1.60 137%	=	13.5 words 80%
Grade 8	8.1 words 94%	×	1.42 85%	=	11.5 words 80%	×	1.37 117%	=	15.9 words 94%
Grade 12	8.6 words 100%	×	1.68 100%	=	14.4 words 100%	×	1.17 100%	=	16.9 words 100%
Superior adults	11.5 words 136%	×	1.78 106%	=	20.3 words 140%	×	1.23 105%	=	24.7 words 147%
For 4 groups Contingency coefficient	.73		.51		.73		N.S.		.64

[1] The values given here are the means of the 18 individual scores on each factor. For superior adults, the arithmetical values actually produced by the multiplication indicated are: (T-unit length) 20.47 × 1.23 = (sentence length) 25.1781.

The "second" means, found by regarding all writings by superior adults as a single body, are computed from these totals: words 18,047, clauses 1,596, T-units 911, sentences 747. A synopsis based on "second" means is as follows.

	Clause length		*Ratio 1*		*T-unit length*		*Ratio 2*		*Sentence length*
Observed value	11.31		1.751		19.81		1.22		24.16
Arithmetical products	11.31	×	1.751	=	19.804	×	1.22	=	24.16088

Working across the bottom from right to left we see that the 47 percent gain in sentence length is not due largely to the trifling 5 percent gain in the number of T-units per sentence. Indeed twelfth graders have approached the ceiling in this trend. (A curve plotted for fourth grade performance to superior adult would sweep down and then rise only slightly.) The 47 percent gain in sentence length is largely due instead to the 40 percent gain in T-unit length. In fact, in T-unit length the superior adult has developed as far beyond the average twelfth grader as the twelfth grader has developed beyond his little brother just beginning to write in the fourth grade. The gains for those two periods happen to be 40 percent, 40 percent.

And what, in turn, accounts for the 40 percent gain in T-unit length? It is not largely the trifling 6 percent gain in number of subordinate clauses. Development in that respect seems to have stopped at a limit which the average twelfth grader has already approached. The 40 percent gain in T-unit length is due largely instead to the whopping 36 percent gain in clause length. In fact, in this one respect the superior adult has developed considerably farther beyond the average twelfth grader than that twelfth grader has developed beyond his little brother in the fourth grade. The two gains in percents are 36 percent as compared with 23 percent. In number of words the gains are 2.9 and 2.0.

Comparatively speaking, then, the biggest single developmental difference between the superior adult and the average twelfth grader is in the length of clauses. The superior adult packs into his clauses a larger number of words, and, one supposes, a larger number of nonclausal structures.

To summarize all this we can read from left to right and note that a 36 percent gain in the first column plus a 6 percent gain in the second produces an effect which amounts to a 40 percent gain in the third. That plus a 5 percent gain in the fourth column produces an effect which amounts to a 47 percent gain in the last. But of all these gains the biggest was back in the first column.

Of all the gain in sentence length which superior adults show as compared to average twelfth graders, 76 percent is due to increased clause length alone.

(For each superior adult, the score on each factor appears in Table 21.)

Table 21 — Clause-to-Sentence Factors for Each "Superior Adult"

	Average clause length	*Ratio of clauses to T-units*	*Average T-unit length*	*Ratio of T-units to sentences*	*Average sentence length*
Atlantic					
A-1	12.5	1.95	24.3	1.32	32.2
A-2	10.3	2.06	21.2	1.34	28.5
A-3	11.7	1.47	17.1	1.16	19.6
A-4	10.7	1.79	19.3	1.41	26.8
A-5	14.2	1.69	24.0	1.05	25.9
A-6	13.3	1.63	21.7	1.24	27.0
A-7	10.3	2.23	23.0	1.29	29.8
A-8	12.9	1.59	20.5	1.04	21.2
A-9	9.4	1.63	15.3	1.54	23.7
Harper's					
H-10	11.3	1.67	18.9	1.15	21.4
H-11	11.0	1.64	17.9	1.27	22.3
H-12	12.0	1.42	16.9	1.31	22.2
H-13	9.5	1.75	16.6	1.11	18.5
H-14	9.9	2.36	23.3	1.16	26.8
H-15	12.1	1.76	21.3	1.24	26.5
H-16	11.7	1.81	21.1	1.18	24.8
H-17	10.2	1.56	16.0	1.19	19.0
H-18	13.2	1.97	26.1	1.09	28.3
Mean	11.5	1.78	20.3	1.23	24.7

4-5. The Contingency Coefficients for Four Groups

The significant contingency coefficients for all four groups (72 individuals) appear across the bottom of the Synopsis (Table 20). (For the ratio of T-units to sentences, the chi-square was not significant.)

As a measure for indicating maturity from grades 4 to 12, T-unit length seemed to be the best overall index. But when superior adults are added—and these writers differ not just in age—clause length becomes as good an index as T-unit length. Therefore, if these twelfth graders of average IQ were to learn to write like these superior adults, they would apparently need to learn to lengthen their clauses. How clauses are lengthened is the subject of the last chapters of this study.

4-6. The Intercorrelation of the Five Synopsis Factors

Though the general reader may have little interest in the intercorrelation of the five factors presented in the synopsis, the research investigator will be interested. In the following chart are presented the statistically significant correlations (at the .05 level) of factors for superior adults (SA) and also for the 72 individuals in this group plus the three grades (All).

	Ratio of clauses to T-units (Ratio 1)	*T-unit length*	*Ratio of T-units to sentences (Ratio 2)*	*Sentence length*
Clause length	All .527	SA .549 All .907	All - .305	All .715
Ratio of clauses to T-units (Ratio 1)		SA .655 All .819	All - .302	SA .685 All .663
T-unit length			All - .340	SA .796 All .793
Ratio of clauses to T-units				All .272

In general, the observations based on the intercorrelations of the three grades, (section 3-21) are confirmed, and the tendencies are extended farther.

1. There still is no correlation between ratio 2 and T-unit length among any one of the four groups, though taking all individuals together there is still a negative correlation between that ratio and all other factors contributing to sentence length. In other words, among superior adults, ratio 2 is still a chance factor affecting sentence length, though over the years a high score on the ratio does indicate immaturity.

2. The tendency for sentence length to become less strongly related to ratio 2 with each successive grade is carried further until for superior adults there is no statistically significant correlation at all.

Whereas for the 54 individuals in the three grades the correlation between these two factors was higher than the correlation between sentence length and any other factor, the effect of the superior adult group is sufficient to lower that correlation for all 72 individuals (.272) until it is below the correlation between sentence length and any other factor (.715, .663, .793).

4-7. Distribution of Clauses among Multi-clause T-units

In an earlier section using a series of bars (Figure 5) we saw what percentage of their clauses each grade puts into 1-clause T-units, 2-clause T-units, 3-, 4-, etc. If now we compare that distribution for superior adults and for average twelfth graders we see the similarity of the two (Figure 8). However, this similarity is no surprise inasmuch as the average number of clauses per T-unit is so close to the same. We must not rush to the conclusion that the two groups are of equal competence in this respect, of course, for the adult clauses are distinctly longer, and quite possibly it is more difficult to incorporate understandably into a T-unit a given number of long clauses than an equal number of shorter clauses.

4-8. The Number of T-units of Various Lengths

In discussing the three grades, we saw that a great number of short T-units was a characteristic of fourth graders, while long T-units were characteristic of twelfth graders. The ratio of shorts to longs was 42 to 1, 5 to 1, 1.4 to 1 for the three grades. Superior adults carry that tendency still further: the ratio of their shorts to longs is 0.5 to 1. Another way to show the same shift is to give the percentage of writing done in such short T-units. It was, for the three grades, 43 percent, 21 percent, 10 percent. For superior adults it is 6 percent. The decline from group to group is remarkably constant.

Table 22 repeats the twelfth grade figures from the earlier Table 10 and adds the comparable figures for superior adults. The adults write only 59 percent as many short units, 51 percent as many middle-length units, but a huge 169 percent as many long units. These figures are really dramatic. Figure 9 repeats the earlier Figure 6 but adds the profile for superior adults. The high bulge to the left in the fourth grade line, indicating a great number of short units, flattens out for successively older groups and moves slightly to the right until finally the bulge almost disappears.

Figure 8

Distribution of Clauses in Multi-clause T-units

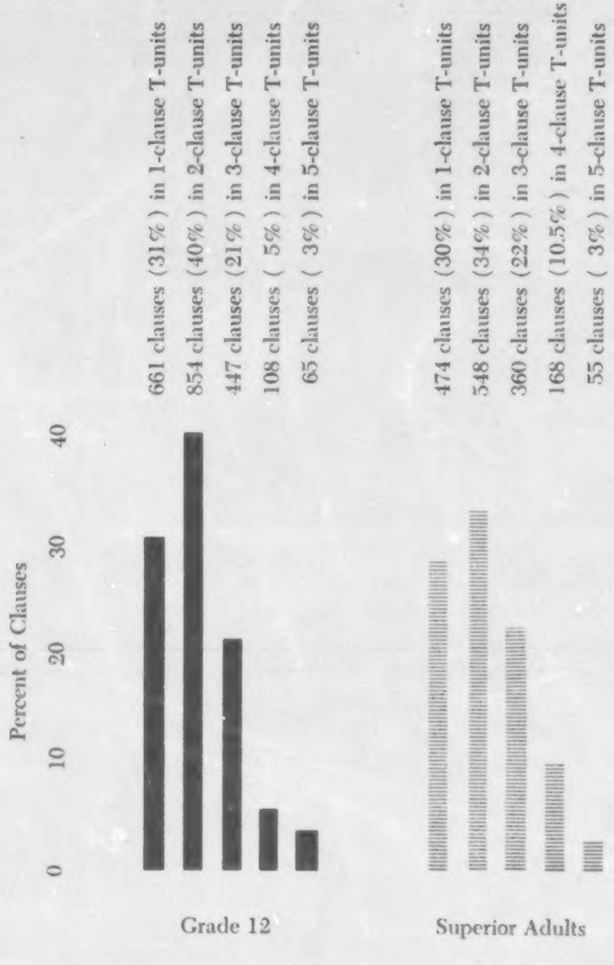

Table 22 — Total Number of T-units of Each Length for Two Groups

Length in words	Number of occurrences	
	Grade 12	Superior adults
"Short" T-units		
1	2	
2	6	3
3	19	8
4	29	18
5	41	33
6	48	27
7	69	42
8	82	43
Subtotal	296	174
	100%	59%
"Middle-length" T-units		
9	96	29
10	91	42
11	76	44
12	73	34
13	80	38
14	60	32
15	72	28
16	52	36
17	51	32
18	55	23
19	39	34
20	31	21
Subtotal	776	393
	100%	51%
"Long" T-units		
21	27	25
22	24	22
23	34	16
24	16	15
25	20	27
26	18	20
27	6	18
28	5	20
29	4	11
30	5	16
31	6	7
32	4	12
33	9	17
34	4	13
35	2	8
36	1	9
37	4	9
38	5	13
39	3	5
40	2	4
41	1	8
42	1	1
43	1	5
44	1	8
45		3
46	1	5
47		1
48		6
49		1
50		2
51		3
52		3
53		
54		
55		1
56		2
57		
58		1
64		1
65		1
66		1
67		1
68		
69		
70		1
80		1
84		1
Subtotal	204	344
	100%	169%
Total of all T-units	1276	911
	100%	71%

Figure 9

Terminable Units of Each Length, for Four Groups

(Average number of terminable units/number words)

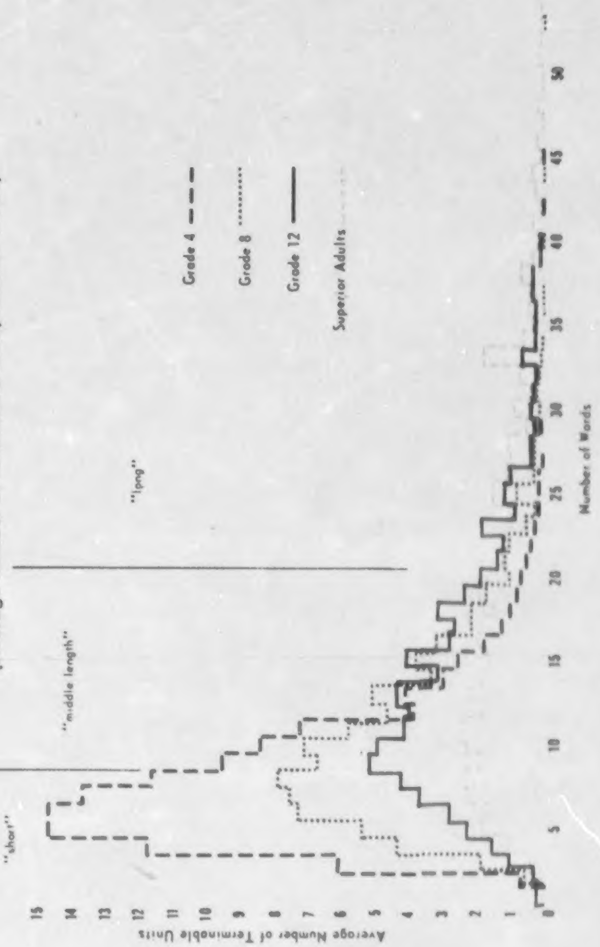

Table 23—Sentences Containing Various Numbers of T-units

	Sentences containing the following number of T-units						*Total no. of T-units*
	1	*2*	*3*	*4*	*5*	*6*	
Grade 12							
No. sentences	909	165	11	1	—	—	
No. T-units in such sentences	909	330	33	4	—	—	1276
% of all T-units in such sentences	71.2%	25.9%	2.6%	.3%			100%
Superior adults							
No. sentences	576	128	21	4	—	—	
No. T-units in such sentences	576	256	63	16	—	—	911
% of all T-units in such sentences	63.2%	28.1%	6.9%	1.8%	—	—	100%

These are all different ways of showing that the structures of young students are realized in many short T-units, but are realized by superior adults in fewer and longer T-units. Short ones become consolidated into longer ones over the years.

4-9. Distribution of T-units among Multi-T-unit Sentences

In section 3-18 we saw in detail the way each grade groups its T-units into sentences. If we now compare the figures for twelfth graders and superior adults, again we are struck by the similarity of the distribution. This is what we might expect from the similarity in the two ratios of T-units to sentences (Table 23).

4-10. Joining Devices Used between T-units within a Sentence

Earlier sections have discussed the number of T-units in sentences, but have not reported all the coordinating conjunctions and the kinds of punctuation used between them. The table below which lists all such devices used by superior adults and average twelfth graders allows us to make certain comparisons. It must be borne in mind at the outset, however, that the twelfth graders write about 4 T-units to the superior adults' 3, so a comparable allowance must be made on the individual items (Table 24).

Table 24 — Various Methods of Joining T-units within a Sentence

	Occurrences for grade 12	*Occurrences for superior adults*
Coordinating conjunctions with or without punctuation		
Coordinating conjunction	107	4
, coordinating conjunction	36	86
; coordinating conjunction	0	20
Subtotal	143	110
Punctuation alone		
,	16	9
;	13	41
:	0	4
Dash or parentheses	8	17
Subtotal	37	71
Nothing	10	0
Total number of joining devices	190	181
Number of T-units	1276	911

1. The two groups use comparable numbers of coordinating conjunctions. Superior adults almost always precede them with punctuation, but these average twelfth graders happened not to.

2. Punctuation without a coordinating conjunction, especially the semicolon, and sometimes the dash or parentheses or even the colon, is commonly used by superior adults but much less often by twelfth graders.

3. What handbooks call the "fused sentence" (nothing between) was used ten times by twelfth graders but never by these superior adults. What handbooks call the "comma fault" (a comma without a coordinating conjunction) was used by both groups, but mature adults strongly prefer to use the semicolon.

4-11. Coordinating Conjunctions to Begin a Sentence

In section 4-10 above, we considered only the coordinators that join T-units within the same sentence. Coordinators can also be used to begin a sentence. At the beginning of a sentence they join the first T-unit of their own sentence with the last T-unit of the preceding sentence. A sort of super-sentence is thus formed.

Superior adults use them far more often than school children do. These adults used 70 of them, whereas twelfth graders used only 29—fewer than half as many. Four superior adults went so far as to use coordinators more often to begin sentences than to join T-units within the same sentence. No twelfth grader did that. Superior adults used a coordinating conjunction to begin, on the average, 1 sentence in 11; average twelfth graders used one to begin, on the average, 1 sentence in 38.

Those teachers who are prejudiced against beginning sentences with a coordinator should reexamine the basis for their attitude. While there may be no necessity to encourage this usage, there is no apparent justification for discouraging it either. It is a completely legitimate device not deserving the reputation that ill-informed gossip has settled upon it.

4-12. The Discreteness of the T-unit and the Punctuated Sentence

It is common for us to think of the sentence as a discrete grammatical element. To the eye it is discrete, for it begins with a capital, ends usually with a period, and is separated from the next sentence by twice the space that separates words. To the ear and the voice it is discrete too, for it is usually ended with some special intonation. How much of that discreteness is borrowed from the T-unit?

Most commonly, of course, one sentence consists of one T-unit. Under those circumstances the two coincide congruently. If they always did, there would be no occasion to ask whether the discreteness resides in the sentence-hood or in the T-unit-hood. But when two T-units are punctuated together as one sentence, there is reason to ask whether the two form a grammatical entity they would not form if punctuated as two separate sentences.

Without doubt, the T-unit can lay claim to its own brand of discreteness. A varied set of grammatical relationships exists inside it. That set includes the subject-verb relation, the verb-object relation, the modal-and-main verb relation, the modifier-head relation, the various subordinate clause-main clause relations, etc. One constituent inside a T-unit can interrupt another, making it discontinuous.

Those relationships just listed never exist outside a T-unit—only inside. No whole T-unit is ever related to another as subject-verb or modifier-head. The T-unit is discrete in the sense that it marks the largest unit in which all these particular relationships exist.

When two T-units are punctuated as one sentence, the boundaries between them are still kept clearly separate: one never overlaps the other; the constituents of one are never broken up to be redistributed discontinuously like the constituents inside T-units (except that one T-unit can be inserted parenthetically inside another). The sentence has no power to split a T-unit: it can combine only wholes, not fractions.

Mature "fragments" are scarcely exceptions. They either delete certain unmistakably recoverable items, or they attest to the force of the rule by abnormal punctuation for special stylistic effects, as poets do with grammar.

There do exist grammatical relationships which may extend from one T-unit to another. Such relationships involve pronouns and antecedents, verb sequences, the definiteness-indefiniteness of articles, etc. "Sentence adverbials" such as "next" or "finally" can relate whole T-units, but these relationships are unaffected by whether the T-units are punctuated as two sentences or one.

In these several respects, a certain order of grammatical discreteness seems to reside in the T-unit, and the sentence seems to be only a visible punctuation device for grouping T-units into appropriate semantic or stylistic units.[2] In this respect sentence markers are like paragraph markers and all the other larger markers for constituents of meaning.

Coordinating conjunctions join T-units. But they also join whole sentences, as we have seen, perhaps creating a kind of super-sentence. The punctuation is immaterial. In this respect coordinators function as certain sentence adverbials do, "however" and "moreover."

In any event, the developmental evidence in this study suggests that grammatical difficulty lies inside the T-unit, and, for the higher levels, down inside the clause. If sentence length is an index of difficulty in older writers, that is because no wider variation exists between the number of T-units in one sentence and another. There is no evidence here that it is more difficult to carry the meaning forward from one T-unit to another in the same sentence than from one to another in adjacent sentences.

4-13. The Clause-to-Sentence Factors in Three Short Stories

An analysis of clause-to-sentence factors for three short stories is relevant to this study at several points. Only the sentences which contain no dialog were considered.

In Hemingway's *The Killers*, the dialog carries the story almost as if the story were a play. The sentences without dialog are extremely short. They are little more than stage business. They average 10.17 words—they are shorter than those by fourth graders. The ratio of T-units to sentences is also extremely low, 1.08, lower than for any other group. The .08 indicates that nine tenths of these sentences contain only one T-unit. Hemingway's T-unit length is short too, but not so extremely short. It is 9.41 words, between the averages for fourth and eighth grades. The ratio of clauses to T-units is again extremely low, 1.17. He uses fewer subordinate clauses than any grade of school children. In fact, the fourth grader, averaging 29 subordinate clauses to 100 main clauses, uses them nearly twice as often as Hemingway does in *The Killers*.

The clause length, however, is a different matter. Averaging 8.68 words, his clauses are a shade longer than those of twelfth graders.

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[2] Strickland observed that the number of words spoken between terminal intonations does not increase as schoolchildren get older. It would be interesting to see whether T-units spoken by these children increase with age. If spoken T-units tend to become longer with maturity but intonation units tend to remain constant, one possible explanation might be that the number of words which can be spoken with a single breath affects the constancy of length.

It is noteworthy, then, that a master of prose, apparently searching for the shortest possible expression, reduces drastically everything but clause length. He rolls three factors back to a fourth grade or pre-fourth grade level. Twelfth graders' sentences are 97 percent longer than their clauses. In this fiction, sentences are only 19 percent longer than clauses.

An opposite extreme appears in Faulkner's *Barn-Burning*. Again only sentences without dialog were considered. Faulkner's clauses average 12.94 words, 50 percent longer than the twelfth grade average, and decidedly longer than the average for the eighteen writers of nonfiction. His number of subordinate clauses is almost exactly that of the nonfiction writers (1.75) and so only triflingly above that for twelfth graders. His high T-unit length (22.62 words) results from the factors noted. The average number of T-units he joins into sentences is 1.50, a figure 28 percent above that for twelfth graders and about 20 percent above that for the nonfiction writers. In fact, the figure is nearly as high as the figure for fourth graders. All these increases make his sentences average 33.85 words, exactly twice the length for twelfth graders. The only one of the clause-to-sentence factors which Faulkner does not greatly increase beyond the twelfth grade level concerns the number of subordinate clauses. Perhaps the language sets a practical limit on the number of subordinate clauses even though the length of clauses can be greatly expanded.

Somewhere in between the extremes of *Barn-Burning* and *The Killers* are the nondialog[3] sentences of Hemingway's *The Short Happy Life of Francis Macomber*. Here the dialog carries less of the story than it did in *The Killers*. So the nondialog sentences seem more typical of narrative prose. Clause length is 9.69 words, between that for twelfth graders and for the eighteen nonfiction writers. The number of clauses per T-unit is down to 1.49, between the eighth and twelfth grade figures. T-unit length, resulting from these two factors, is within 1 percent of the twelfth grade figure. The number of T-units per sentence is 1.48, an unusually high figure, approaching that for Faulkner. Sentences in this story average 21.4 words; they are longer than those by twelfth graders but shorter than those in the articles.

However, the average for the number of T-units per sentence does not give an adequate picture for this Hemingway story, though it does for the Faulkner story. For Faulkner the distribution of T-units in sentences looks much like the picture for nonfiction writers given in Table 23. Hemingway, however, resorts to an unusual device to give the effect of fast, continuous, and even blurred excitement at the moments when the buffalo are running and the hunters are shooting. Then he strings together into one sentence an immense number of T-units: 6 on two occasions, and 9 on two other occasions.

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[3] One 93-word sentence which contained only 1 word of dialog, and another 74-word sentence which contained only 5 words of dialog, were both included with the nondialog sentences.

To summarize the three stories, then, we can say that the sentences containing no dialog in *The Killers* are extremely short because they contain almost nothing but single clauses. Those clauses are longer than twelfth grade clauses, however. In *Barn-Burning* Faulkner's nondialog sentences are extremely long because he increases all the factors—except number of subordinate clauses—far beyond the point to which those factors are carried by the writers of articles. For *Macomber* the factors fall between the extremes set by the other two stories. They fall rather close to the level established by eighteen writers of articles.

These three stories, small though they are as samples, provide data that are relevant to this study at several points. Most conspicuously, they illustrate the range of variation that occurs when language is manipulated consciously for special effects. The analysis given them illustrates the possible usefulness of the clause-to-sentence factors as an entering wedge for a more detailed and revealing analysis of literary style. The variation in the narrative styles here examined cautions us not to conclude prematurely that the differences between fourth and twelfth grade writing are due largely to some decline in the proportion of narration that may appear from grade to grade. The deliberate use of special devices for special effects—the four extremely low factors for Hemingway's *Killers*, and the four sentences with extremely high numbers of T-units in *Macomber*—should supply a salutary caution against the overreliance upon quantitative data such as that provided in this study.

4-14. A Summary of the Clause-to-Sentence Findings for Superior Adults

The fourth group of writings to be studied consist of the first thousand words from each of nine articles in *Harper's* and nine in the *Atlantic*, published in the first months of 1964. The writers in this fourth group do not present a stage in a simple developmental continuum, of course, for their IQ's are not known to be average, like those of the schoolchildren, and one would feel confident that they were distinctly superior. Nonetheless the writings do provide significant evidence on the possibilities of development in the language, even though the average twelfth grader may never learn to exploit those possibilities fully.

1. Of the various differences in clause-to-sentence length factors between average twelfth graders and superior adults, the most distinctive difference is in clause length. Superior adults pack 36 percent more words into their clauses. That difference is greater than the difference between average twelfth graders nearly ready to graduate and average fourth graders just beginning to write. The average twelfth grader still has far to go.

2. This remarkable difference in clause length is enough to account arithmetically for three fourths of the difference in sentence length between twelfth graders and superior adults. Superior adults use only a trifling 6 percent more clauses per T-unit and 5 percent more T-units per sentence.

3. The contingency coefficients for the five factors in the synopsis indicate that, considering all four groups, clause length and T-unit length are equally good indexes of maturity. Sentence length is less good. For the three grades alone, as was indicated in the summary at the end of the previous chapter, T-unit length is a better index of maturity than clause length, according to the contingency coefficients.

4. For this fourth group, as for all younger groups, there is no significant correlation between the ratio of T-units to sentences and either clause length, or the ratio of clauses to T-units, or T-unit length. For the fourth group that ratio does not even correlate significantly with sentence length: it is completely extraneous, a chance factor exerting a weak influence on sentence length.

5. Looking at the intercorrelations of the clause-to-sentence factors for each group by itself, and watching the shift from group to group, we see a clear trend in the influence of the various factors on sentence length.

In grade 4, clauses are so close to minimal length for all individuals that individual differences in this respect are overshadowed by the individual differences in the number of subordinate clauses added to main clauses. But the effect of both these differences is overwhelmed by the number of T-units per sentence. Hence the extremely high correlation of .961 between sentence length and that last ratio.

For superior adults almost the reverse is true. Clauses are now far above minimal length for all individuals and the individual differences in this respect are about equally influential with the differences in number of subordinate clauses. These differences together now overwhelm the number of T-units per sentence, so that the correlation is no longer significant between sentence length and the latter ratio.

Between fourth graders and superior adults, eighth graders and twelfth graders mark fairly regular stages in that development.

CHAPTER 5. FINDINGS: KINDS OF SUBORDINATE CLAUSES WITHIN T-UNITS

5-1. The Purpose of This Chapter

The number of subordinate clauses per T-unit already has been found to increase with successively older grades. The chief question to be answered in this chapter is whether the various kinds of subordinate clauses all increase apace, or whether some kinds but not others are used more often by older students.

5-2. The Three Kinds of Subordinate Clauses

In conventional terminology, clauses are structures with a finite verb as well as a subject. (These verbs have a tense marker as well as a subject.) For instance, the italicized words are considered a clause in the sentence "She told me *I ought to keep quiet*." But in the sentence "She told me *to keep quiet*" there is no subordinate clause. We might call *to keep quiet* a "near-clause."

Traditionally, subordinate clauses are classified into three subgroups: noun clauses, adjective clauses, and adverb clauses. Noun clauses usually are direct objects after some verb like *think*, or *say*, or *ask* ("I thought [*that*] *he would be here*." "I asked *who would be there*.") Noun clauses occasionally appear as predicate nominals and subjects and in other positions which nouns occupy, as will be discussed later.

Adjective clauses always follow the nouns they modify (though not always immediately). ("He's the one [*that* or *who* or *whom*] I told you about.")

Adverbial clauses, in contrast to the other two kinds, are, except in special cases, movable. That is, they can precede or follow or interrupt the main clause to which they are attached. ("When she comes, we'll leave." "We'll leave when she comes.") Clauses of comparison, however, are not movable, though they are commonly classed as adverbial.

5.3 Some Formal Differences between Coordinated and Movable Subordinated Clauses

In school texts it is often said that coordinated clauses are of equal importance but subordinate clauses are those of subordinate importance. That is obviously untrue on various occasions, for instance any time when what is said or thought in a noun clause is more important than who said it: "Someone said that a stitch in time saves nine." A *because*-clause is not always less important than the result clause which follows, though the *because*-clause is always subordinate.

The meaning relations expressed by a subordinator are sometimes very similar, if not identical, to those expressed by a coordinator. *Because,* a subordinator, sometimes expresses the same meaning expressed by *for,* a coordinator. It is not on grounds of "meaning" or "importance," then, that subordinate clauses can be isolated, but on grounds of formal structure alone.

In the following pair of sentences the same meaning is conveyed, with no more than stylistic differences, whether a coordinator or subordinator is used: "Mother came home and I got punished"; "When Mother came home I got punished." The form, of course, is not the same for the two. A clause introduced by a subordinator can either precede or follow the main clause to which it is related, but a clause introduced by a coordinator cannot precede the clause to which it is related; it can only follow. Thus, it is English to say "I got punished when Mother came home," but it is not English to reverse the clauses in the other sentence so that it reads "And I got punished, Mother came home."

A subordinator can relate its own clause either leftward or rightward to a different clause: that is why the subordinated clause is movable. However, a coordinator between T-units relates its own clause always leftward to something else. That is why it is not movable.

There is a second formal difference between subordinators and coordinators. Though we have spoken, on several previous occasions, about coordinators between main clauses, we have meant, more strictly speaking, coordinators between T-units, for whole T-units are joined whether the T-units happen to be of the single clause or multi-clause variety. If a sentence begins "And when . . ." we understand that the *and* joins to the preceding T-unit both the "when-" clause and the main clause which must follow: in other words, the *and* joins the preceding T-unit to the following whole T-unit. (T-unit #5 in 3-8 is an example.) Subordinators, in contrast, do not do that. They only relate their own clause, whatever it may contain, to another clause. They do not relate one whole T-unit to another.

A third formal difference is that in contemporary standard English a coordinator often begins a sentence where it relates leftward to the preceding T-unit even across the sentence punctuation boundary. A subordinator, in contrast, never relates across a sentence punctuation boundary.

To summarize, then, (1) a subordinator relates its clause to another on either its left or right, whereas a coordinator relates its structure to another on its left. (2) A coordinator can relate even multi-clause T-units to each other, whereas subordinators relate only clauses to each other. (3) A coordinator at the first of a sentence relates leftward even across a sentence boundary, whereas a subordinator never subordinates across a sentence boundary.

5-4. Two Kinds of Noun Clauses

There are two kinds of noun clauses. One is like an indirect question, the other like a statement of fact. The factive noun clause, as Lees calls it, introduced by *that*, or with *that* deleted, appears in positions where a factive noun can occur. "She told me something" can be combined with "I ought to keep quiet" to produce "She told me (that) I ought to keep quiet." Here a clause does replace the noun *something* as direct object, and in other sentences it can replace a noun as subject or predicate nominal, or object of a preposition.

The second kind of noun clause, instead of being an assertion, is in several respects like an indirect question. The sentence "She asked me something" can be combined with "Who went to the game" to produce "She asked me who went to the game." Again the clause replaces a noun.

5-5. The Frequency of Noun Clauses

Quoted conversation is ordinarily introduced by an expression like "He said . . . ." In a sense the quotation is direct object of the transitive verb *say*. There is some reason, then, to tabulate direct discourse along with noun clauses.

Fourth graders, since they tended to write about what people said and did, used a great deal of direct discourse. For the three grades it appeared 106, 43, 18 times.

Older students were more inclined to paraphrase what someone said. Also they used the noun clause to talk about ideas and beliefs. They used indirect discourse or indirect questions, usually as direct objects after some verb like *think* or *believe* or *ask*. The three grades

Table 25 – Words Used to Introduce Noun Clauses

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
that	11	28	39	23	31	54	102	76	178
ϕ (deleted *that*)	32	40	72	27	38	65	26	60	86
(reason was . . .) because	—	—	—	2	3	5	—	—	—
(reason was . . .) so	—	—	—	—	—	—	1	—	1
Subtotal	43	68	111	52	72	124	129	136	265
Direct Discourse	30	76	106	8	35	43	6	12	18
Interrogative pronouns and adverbs									
what	9	22	31	15	11	26	22	12	34
whatever	—	1	1	—	—	—	—	—	—
how	—	6	6	7	9	16	3	7	10
if	7	10	17	—	3	3	8	2	10
whether	—	—	—	—	—	—	3	2	5
where	4	4	8	8	2	10	4	3	7
why	2	1	3	8	1	9	1	8	9
who	—	6	6	5	1	6	6	1	7
whoever	—	1	1	—	—	—	—	—	—
when	2	—	2	1	3	4	2	1	3
which	—	—	—	1	1	2	—	2	2
how long	—	—	—	1	1	2	—	—	—
how and what	—	—	—	—	—	—	—	1	1
how and why	—	—	—	1	—	1	—	—	—
where and how	—	—	—	1	—	1	—	—	—
Subtotal	24	51	75	48	32	80	49	39	88
Total	97	195	292	108	139	247	184	187	371

The number of noun clauses written by each student was subjected to an analysis of variance, 2 × 3 factorial. The significance for sex and also for grade was found to be at the .05 level.

used noun clauses exclusive of direct discourse 186, 204, 353 times. In percentages the increase is 52 percent, 58 percent, 100 percent.

The increase of these latter noun clauses partly offsets the decrease in direct discourse so that the totals for the three grades are 292, 247, 371 (Table 25). The overall increase is statistically significant for sex and also for grade, but only at the .05 level.

5-6. The Functions of Noun Clauses inside Main Clauses

The great majority of noun clauses are direct objects. However, the ability to use noun clauses in the other positions appears to be a mark of maturity. At least older students do so with increased frequency: 16, 45, 63. Table 26 gives further details.

Table 26 — Functions of Noun Clauses within Main Clauses

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Subject									
that or ϕ, etc.	—	1	1	2	6	8	2	1	3
question clause	—	1	1	1	—	1	—	—	—
Object of preposition									
that or ϕ	—	—	—	—	—	—	—	—	—
question clause	—	1	1	3	1	4	8	7	15
Predicate nominal									
that or ϕ or *so* or *because*	—	8	8	9	8	17	9	5	14
question clause	1	3	4	11	2	13	6	4	10
Other									
that or ϕ	—	1	1	1	—	1	12	9	21
question clause	—	—	—	—	1	1	—	—	—
Subtotal									
that or ϕ, etc.	—	10	10	12	14	26	23	15	38
question clause	1	5	6	15	4	19	14	11	25
Subtotal			16			45			63
Direct object									
that or ϕ	43	58	101	40	58	98	106	121	227
question clause	23	46	69	33	28	61	35	28	63
direct discourse	30	76	106	8	35	43	6	12	18
Total			292			247			371

5-7. How an Independent Clause Becomes an Adjective Clause

When two sentences contain the same nominal, they usually can be combined so that one becomes an adjective clause embedded in the other. Thus "We recognized the car" plus "The car hit the dog" can be combined to produce a new sentence, "We recognized the car which hit the dog." In the second sentence the common nominal *the car* was replaced by an appropriate relative pronoun *which* and that whole structure was embedded in the first sentence immediately after the same nominal *the car* that was replaced by the relative pronoun.

Other sentences containing an adjective clause can be regarded as the product of two sentences containing, instead of a pronoun, an adverbial common to both. Thus, "He worked at the store" plus "We bought our groceries at the store" can be combined to produce a new sentence "He worked at the store where we bought our groceries." In the second sentence the common adverbial *at the store* was replaced by an appropriate relative adverb *where* which was then moved to the first of the structure. Then the whole structure was embedded in the first sentence immediately after the same adverbial that was replaced by the relative pronoun.

Obviously two sentences combined in this fashion will have the effect of replacing two T-units with a new and longer one. If older students should write more of these combinations, then their T-units would tend to be longer.

5-8. The Fruquency of Adjectival Clauses

The frequency of adjectival clauses does indeed increase from fourth to eighth and from eighth to twelfth grades. It more than doubles. The number of occurrences in fourth, eighth, and twelfth grades is, respectively, 96, 144, 210; in percentages the increase is from 46 percent to 68 percent to 100 percent. The increase is about equal for the first and last halves of the eight-year time span (Table 27). The increase is statistically significant for grade at the .01 level.

5-9. Words Introducing Adjective Clauses

Table 27 lists the various relative pronouns and adverbs used to introduce adjective clauses. Two observations can be made.

One observation is that *whom* is almost never used. It appeared just once, though 173 relative pronouns served as objects of prepositions or objects of verbs. Some of those must have replaced human

Table 27 — Words Used to Introduce Adjective Clauses

	Grade 4			Grade 8			Grade 12		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Relative pronouns									
ϕ (deleted relative)	16	14	30	29	13	42	22	28	50
that	14	13	27	24	33	57	35	20	55
who	5	21	26	8	4	12	21	21	42
whom	—	—	—	—	—	—	1	—	1
whose	—	1	1	—	—	—	2	—	2
which	2	1	3	9	16	25	22	28	50
of which	—	—	—	—	—	—	1	—	1
in which	—	—	—	—	—	—	4	—	4
Subtotal			87			136			205
No. of different introducers			5			4			8
Relative adverbs									
where	3	2	5	3	2	5	3	—	3
when	2	1	3	—	1	1	1	—	1
while	1	—	1	1	—	1	1	—	1
(reason) why	—	—	—	—	1	1	—	—	—
Subtotal			9			8			5
Total			96			144			210

The number of adjective clauses written by each student was subjected to analysis of variance, 2 × 3 factorial. The significance was found to be for grade at the .01 level.

nouns so that *whom* would have been allowable, yet in 172 cases out of 173, relative pronoun *who* or *that* or nothing was used instead. *Whom* was scarcely in the writing vocabulary of these students.

A second observation is that relative pronouns as objects of prepositions are almost always separated from their prepositions. That is, students prefer "I know the store (*which, that*) he works in," not "I know the store in which he works." Though the three grades used relatives as objects of prepositions 45 times, they separated the object 40 times. The 5 occasions when the object was not separated occurred all on the papers of one student, a twelfth grader. (In noun clauses, 7 interrogative pronouns were objects of prepositions. They too were all separated from their prepositions.)

5-10. Movable Adverb Clauses

The position of a noun or adjective clause is fixed inside the main clause which contains it. The position of a noun clause is inseparable from its function as subject or object, etc. The position of an adjective clause is also fixed; it always follows the noun it modifies, though not always immediately.

The adverbial clauses to be discussed here are not fixed but movable. That is, they can appear in initial position (before their main clause), or in final position (after their main clause), or they can interrupt their main clause.

To convert a sentence to an adverbial clause requires only that a subordinator be placed at the beginning. "He came" is easily combined with "I left" to produce "If he came I left" or "When he came I left" or "Because he came I left," or "Even though he came I left." No problem of choosing an appropriate relative pronoun or interrogative pronoun is involved, and no change of word order is involved.

Fourth graders produce these movable adverbial clauses with facility, though not quite so frequently as do older students. The number of occurrences for the three grades is 222, 252, 269. In percents the increase is 82 percent to 93 percent to 100 percent (Table 28). There is no statistically significant increase in adverbial clauses, from grade to grade, though the increase in noun clauses and adjective clauses is statistically significant.

5-11. The Words Introducing Adverb Clauses

Several investigators have subclassified adverbial clauses into those designating time, place, condition, concession, etc. LaBrant and Harrell and Watts are among them. Usually time and cause clauses are reported to be most common.

This study has not used that classification because many clauses can be fitted to it only arbitrarily. However, the words introducing all adverbial clauses have been tabulated. They appear in Table 28.

As shown there, all three grades rely especially heavily on three subordinators, *when, if,* and *because*. Those three account for the majority of all movable clauses for all grades: 74 percent, 64 percent, 61 percent. However, among the three the favorite changes. *When* is the favorite of fourth graders, but its frequency drops from 101 occurrences to 73 to 53. *Because* stays about the same. *If* increases sharply in twelfth grade usage, changing from 30 to 33 to 73 occurrences.

Table 28 — Frequency of Subordinators

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
when	51	50	101	31	42	73	26	27	53
% of totals			46%			29%			20%
whenever				1		1			
even when								1	1
when and if				1		1			
if or when								1	1
if	16	14	30	17	16	33	33	40	73
even if							1	1	2
as if (see when and if, if or when)				1		1			
because	18	16	34	16	19	35	13	25	38
because how . . .?								1	1
as		2	2	5	5	10	16	5	21
just as	1	1	2		2	2	1		1
while	5	8	13	3	6	9	4	1	5
until		4	4	5	12	17	6	2	8
not until								1	1
till	1	1	2		4	4	1		1
after	4	3	7	6	5	11	3	6	9
right after		1	1						
before	1	1	2	6	5	11	2	8	10
just before								1	1
right before					1	1			
so	3	2	5	3	10	13	1	1	2
so that	2		2	1	1	2	6	3	9
since		2	2	5	2	7	2	6	8
ever since	1		1						
like	3	5	8	3	4	7		1	1
where	1	2	3	2	1	3	1		1
although				2	1	3	3		3
even though	1	1	2				1	1	2
unless				1	1	2	2	2	4
once								2	2
except that					1	1			
except ϕ					1	1			
whether							1		1
whereas								1	1
different than				1		1			
special "which"					1	1		3	3
no matter what		1	1				1		1
no matter how					1	1	1	2	3
no matter if					1	1	2		2
Total	108	114	222	110	142	252	127	142	269
			82%			93%			100%
No. of subordinators			19			27			31

One is tempted to speculate that the shift in subordinators reflects a shift in type of thinking, away from time orientation to an if-then type of thinking.

The repertoire of different subordinators increases with the older grades, from 19 to 27 to 31.

5-12. The Position of Adverb Clauses

Rhetoric handbooks occasionally urge students to achieve variety in word order by putting adverbial clauses at the beginning of sentences instead of at the end. Such advice is usually exemplified by sentences for which the advice is clearly sound. But if the student generalizes from those specially chosen examples, then, according to the evidence of this study, he will have been misled.

If in Table 29 we look to the total for all movable adverbial clauses, we see that the initial position is preferred by fourth graders more strongly than it is preferred either by the eighth or the twelfth graders. Preferring that position can hardly be called a mark of maturity.

If we look to the individual subordinators and the position their clauses usually occupy, we note something that has not often been remarked. Though all these have been described as movable,[1] certain subordinate clauses seem more comfortable in final position, whereas others seem more comfortable in initial position. For instance, in the writings of all three grades, *because*-clauses are far more common in final position than in initial or medial position. *Before*-clauses are usually final, and *after*-clauses are usually initial. The number of instances is too small, of course, to allow confident generalizations.

Interrupters are seldom used by anyone, but older students use them somewhat more frequently. In percentage of all clauses, their frequency for the three grades is 2 percent, 5 percent, 7 percent.

Other Kinds of Subordinate Clauses

5-13. Clauses of Comparison

Clauses of comparison like *I felt more discouraged than he did* clearly must be separated from other adverbial clauses like *I felt dis-*

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[1] It is doubtful that *like*-clauses are movable for many people; perhaps *like* is a coordinator or perhaps it is neither a subordinator nor a coordinator. *As*, which is often spoken of as the "correct" form to replace *like*, introduces movable clauses and so is clearly a subordinator. The use of *like*-clauses declines sharply among the writers in this study. The use of *as*-clauses increases markedly.

Table 29—Positions of Movable Adverbial Clauses as Introduced by Specified Subordinators

I = Initial: preceding the main clause
M = Medial: interrupting the main clause
F = Final: following the main clause

		Grade 4			*Grade 8*			*Grade 12*		
		Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
when	I	45	37	82	23	24	47	14	13	27
	M		1	1	2	1	3	4	2	6
	F	6	12	18	6	17	23	8	10	18
whenever	F				1		1			
even when	I								1	1
when and if	I				1		1			
if or when	I								1	1
(second day when)	I								1	1
	F								1	1
if	I	12	10	22	11	7	18	20	23	43
	M	2	1	3	1	2	3	4	3	7
	F	2	3	5	5	7	12	9	14	23
even if	I								1	1
	F							1		1
as if	F				1		1			
(see *when and if, if or when*)										
because	I		1	1	1		1		1	1
	M				4		4		2	2
	F	18	15	33	11	19	30	13	22	35
because . . . how	F								1	1
as	I				3	3	6	13	5	18
	M					1	1			
	F		2	2	2	1	3	3		3
just as	I	1		1		1	1	1		1
	F		1	1		1	1			
while	I	4	2	6	1	3	4	2		2
	M							1		1
	F	1	6	7	2	3	5	1	1	2
until	I					1	1		1	1
	F		4	4	5	11	16	6	1	7
not until	F								1	1
till	F	1	1	2		4	4	1		1

Table 29 — Continued

		Grade 4			*Grade 8*			*Grade 12*		
		Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
after	I	2	3	5	6	3	9	2	6	8
	F	2		2		2	2	1		1
right after	I		1	1						
before	I				1		1		1	1
	F	1	1	2	5	5	10	2	7	9
just before	I								1	1
right before	I					1	1			
so	M				1		1			
	F	3	2	5	2	10	12	1	1	2
so that	F	2		2	1	1	2	6	3	9
since	I				1	1	2	1	2	3
	M							1		1
	F		2	2	4	1	5		4	4
ever since	I	1		1						
like	M				1		1			
	F	3	5	8	3	4	7		1	1
where	I		1	1						
	F	1	1	2	2	1	3	1		1
although	I					1	1	2		2
	M							1		1
	F				2		2			
even though	I	1	1	2						
	M							1		1
	F								1	1
unless	F				1	1	2	2	2	4
once	I								1	1
	F								1	1
except that	F					1	1			
except ϕ	F					1	1			
whether	F							1		1
whereas	I								1	1
different than	F				1		1			
special "which"	F					1	1		3	3
This listing is questionable. An example: "He yelled, which made me mad."										

Table 29 — Continued

		Grade 4			*Grade 8*			*Grade 12*		
		Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
no matter what	F		1	1				1		1
no matter how	I								2	2
	F					1	1	1		1
no matter if	F					1	1	2		2
Totals:										
In initial position				122 56%			93 37%			116 43%
In medial position				4 2%			13 5%			19 7%
In final position				96 42%			146 58%			134 50%
				222 100%			252 100%			269 100%

couraged because he did (felt discouraged). One dependent clause is movable but the other is not. We might say *Because he felt discouraged, I felt discouraged,* but not *Than he did, I felt more discouraged.*

The comparative clause often functions like an adverb of degree such as *very, rather, quite. I felt very discouraged* is related to the hypothetical *I felt (more-than-he-felt-discouraged) discouraged,* with certain elements transposed and deleted.

The clause of comparison can modify adverbs as well as adjectives, just as *very* can: *I played very poorly, I played more poorly than he did.* In addition to *more . . . than,* other introducers appear, such as *-er . . . than, less . . . than, as . . . as, so . . . that* (I felt so discouraged [that] I cried).

There is no significant increase in the number of comparison clauses from fourth grade to twelfth. However, the two older grades do vary the pattern more widely, each using eight forms of the comparative, whereas fourth graders use only four. These patterns are given in Table 30.

5-14. Reduced Clauses of Comparison

Clauses of comparison are often reduced by the deletion of some or all of the elements common both to the main clause and the clause of comparison. Thus "I played more poorly than Jim played" becomes "I played more poorly than Jim." Such reduced clauses of comparison

Table 30 — Structures of Comparative Clauses

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
so Adj. that Sentence	2	1	3	6	2	8	1	—	1
as Adv. as S	—	2	2	—	1	1	—	—	—
so Adj. ϕ S	—	2	2	1	—	1	—	1	1
so Adv. ϕ S	—	1	1	—	—	—	—	—	—
as Adj. as S	—	—	—	1	2	3	2	—	2
same thing then as S	—	—	—	1	—	1	—	—	—
as much as S	—	—	—	—	1	1	1	—	1
more than S	—	—	—	—	1	1	1	1	2
less than S	—	—	—	—	1	1	—	—	—
to such an extent that S	—	—	—	—	—	—	1	—	1
-er than S	—	—	—	—	—	—	—	1	1
so much that S	—	—	—	—	—	—	—	1	1
Total	2	6	8	9	8	17	6	4	10
No. of different structures used			4			8			8

were not common, but they were used more often by the two older grades (9, 16, 15).

5-15. A Clause as Complement to an Adjective

Clauses can appear as complements to certain adjectives as in "I'm glad (that) you can come." This construction was used 7 times by fourth graders, 7 times by eighth graders, and 13 times by twelfth graders. There is no indication that twelfth graders use it more often characteristically, however, for the girls in that grade used it 11 times while the boys used it only twice.

In all examples, the adjective was in predicate adjective position. The clause cannot be moved away from the adjective.

5-16. The Subjunctive Inversion of Word Order

Two twelfth grade girls produced subjunctive forms beginning "Had I not . . ." and "Had it been . . ." This inversion was not used by younger students.

Subjunctive clauses like these are subordinate; they cannot constitute a sentence by themselves. They are movable with respect to their main clause, but were not totaled in with adverbial clauses. They have no subordinating word like an *if*.

5-17. "The More the Merrier"

Sentences like "the more the merrier" are descendants from Anglo-Saxon instrumental correlatives. That rare pattern is still alive today, and variations on it were produced 5 times by twelfth graders, only once by eighth graders, and not at all by fourth graders.

The examples were these:

Eighth grade

> "The faster the population increases the faster more housing, towns, roads, and schools have to be built."

Twelfth grade

> "The deeper everyone got trying to find out who killed Macbeth, then the more trouble was brought upon them."
>
> "The more time spent on sentence structure by writing paragraphs and themes, the better acquainted a student becomes to the rules."
>
> "The hotter it gets, the more they wear."
>
> "They think that the more clothing they wear, the better it will block out the heat."
>
> "The more you think about it the sillier it gets."

5-18. The "Deferred Subject" Sentence

Sentences like "It was good that he came" and "It was good for him to come" have alternate versions with the nominal as subject: "That he came was good" and "For him to come was good." Only the first pair of examples contains a subordinate clause.

The frequency of such sentences was 15, 22, 37.

5-19. The "Cleft" Sentence

The "cleft" sentence differs from the "deferred subject" sentence, in that it does not have corresponding alternate versions. "It is the woman who always pays" does not have a corresponding "who always pays is the woman." Similarly, "It was in 1953 that it happened" does not have a corresponding "That it happened was in 1953."

The frequency of such "cleft" sentences was 25, 16, 18.

5-20. Consolidating T-units by Means of Subordination

In Chapter 3 we saw that fourth graders write a great many short single-clause T-units with *and's*, or punctuation, or nothing between.

As students mature, they learn to reduce more of these single-clause T-units to subordinate clauses. The subordinator for an adverbial clause establishes a semantic relationship between two clauses, and often establishes it more precisely than *and* or nothing. Fourth graders missed many opportunities for such consolidation.

> They went around several blocks *and* his grandfather came out.
> (They went around several blocks *until* his grandfather came out.)
> He came to a grassy plot. He met a big animal.
> (He came to a grassy plot *where* he met a big animal.)

Fourth graders used nothing where the following subordinators appear in brackets.

> "[When] He smelled something like a big chicken one day in his master's house he ate it up very fast because chicken was his best dish."
> "[When] He jumped on the chicken it bounced up in the air."
> "The cook house is an important place on the circus grounds [because] meals for hundreds of people are fixed there everyday."

Repeatedly fourth graders use the same nouns in adjoining single-clause T-units without reducing one to an adjective clause. Here are a few of the many examples where opportunities for such consolidation were missed.

> There was a lady next door *and* the lady was a singer . . .
> (There was a lady next door *who* was a singer.)
> Moby Dick was a very big whale. He lived in the sea.
> (Moby Dick was a very big whale *who* lived in the sea.)
> He had a friend named Fats *and* he had a bicycle.
> (. . . *who* had a bicycle)
> His owner was a milkman the milkman was very strict to the mother and babies. (. . . *who* was very strict to the mother and babies).

Each time one T-unit is reduced to a subordinate clause and is consolidated with another clause, the T-unit length, an index of maturity, is suddenly about doubled.

5-21. Summary on Subordinate Clauses

The Synopsis of Clause-to-Sentence Factors in Chapter 3 showed that older students tend to put more subordinate clauses into their T-units. The purpose of this chapter was to separate the several kinds of subordinate clauses and see whether all kinds increase apace or whether some kinds tend to increase more than others. (The figures are summarized in Table 31.)[2]

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[2] The analysis of variance is still applied to the number of items produced by each student. If, instead, the number of items produced per T-unit had been tested, the significance for each variable would probably have been higher, and, perhaps, the variable which does not now show significance would then have shown it.

Table 31 – Summary of Subordinate Clause Frequency

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Noun clauses									
that or ϕ, etc.	43	68	111	52	72	124	129	136	265
indirect question	24	51	75	48	32	80	49	39	88
Subtotal			186			204			353
			52%			58%			100%
direct discourse	30	76	106	8	35	43	6	12	18
Total	97	195	292	108	139	247	184	187	371
			79%			67%			100%
No. per T-unit			.137			.156			.29
Adjective clauses	42	54	96	74	70	144	113	97	210
			46%			68%			100%
No. per T-unit			.045			.09			.165
Adverb clauses	108	114	222	110	142	252	127	142	269
			82%			93%			100%
No. per T-unit			.104			.158			.21
Clauses of comparison	2	6	8	9	8	17	6	4	10
Adjective complement clauses	4	3	7	2	5	7	2	11	13
Word order subjunctive	—	—	—	—	—	—	—	2	2
Total of all subordinate clauses	253	372	625	303	364	667	432	443	875
			71%			76%			100%
No. per T-unit			.30			.42			.68
Total not including direct discourse	223	296	519	295	329	624	426	431	857
			61%			73%			100%

1. The most important developmental trend is the increase in adjective clauses, those with a relative pronoun or relative adverb and which modify nouns. They more than double in frequency: 46 percent, 68 percent, 100 percent. The percentage increase is slightly greater during the second half of the time span. The statistical significance of the change is for grade only, and at the .01 level.

The number of adjective clauses per T-unit for the three grades is .045, .090, and .16—an almost fourfold increase.

Though the superior adults described in Chapter 5 are not just average twelfth graders grown older, a study of their use of subordinate clauses is nonetheless relevant at this point. On the whole their ratio of clauses per T-unit (and hence of subordinate clauses to main clauses) is only a trifling amount higher than the number for twelfth graders. However, a breakdown of that number is most interesting. They use more adjective clauses than twelfth graders, but they use fewer noun clauses and fewer movable adverb clauses.

This fact adds weight to the evidence given above that the increase in number of adjective clauses is most important as an index of maturity. Superior adults use .25 per main clause. The rate of increase from one of the four groups to the next is remarkably steady, and also rather dramatically large. Over the three grades the increase is nearly fourfold, but if we include the fourth group the increase is more than fivefold. The likelihood that a fourth grader will embed an adjective clause somewhere in a T-unit is only 1 in 20. The likelihood that a superior adult will do so is 1 in 4.

Though the nondialog sentences in *The Short Happy Life of Frances Macomber* provide a small sample, nonetheless the fact that Hemingway here uses .20 adjective clauses per T-unit (more than twelfth graders) suggests that this index is not much affected by the difference between expository articles and fiction.

The additional fact that Faulkner in *Barn-Burning* uses .30 adjective clauses per T-unit in his nondialog sentences adds even more weight to that evidence.

2. a) The second trend that is statistically significant is the increase in noun clauses. This trend is significant for grade (and also for sex) at the .05 level. The percentage change is from 79 percent, to 67 percent, to 100 percent. The overall percentage increase is about half that shown by adjective clauses. The number of noun clauses per T-unit is .14, .16, .29. Superior adults use only .23, thus falling between grades 8 and 12.

b) Within noun clauses there is a pronounced shift away from what is said and toward what is thought or believed. The number of instances of direct discourse after verbs such as *say* was, from grade to grade, 106, 43, 18. The other noun clauses used as objects after verbs such as *say, think, believe, ask,* increase in number from 170 to 159 to 290. (Note the slight drop for eighth grade before the big increase.)

The shift away from direct discourse obviously accompanies a shift in subject matter or, more accurately perhaps, in treatment of subject matter. But common experience would suggest that to some extent such a shift in subject matter is a general characteristic of increasing age and schooling. If such is the case, then it would be undesirable for a developmental study to restrict the subject matter in such a way as to inhibit or obscure this trend. This problem is referred to in 7 below.

c) Though they were too few to be tested statistically like the others, those noun clauses which did not function as objects after verbs like *say, think, ask* may be more significant of maturity than all the others. As subjects, objects of prepositions, predicate nominals, etc., noun clauses increased markedly, from 16 to 45 to 63.

3. a) Movable adverbial clauses show no change that is statistically significant, though they do increase. The percentages are 82 percent, 93 percent, 100 percent. For each T-unit, the numbers used were .10, .16, .21. Superior adults used .20. *Macomber* showed .25; *Barn-Burning* showed .32.

b) Placing adverb clauses before the main clause is apparently no indication of maturity.

4. The variety of words introducing the various kinds of clauses increases with age, and types of adverbial clauses shift in frequency.

5. There can be no doubt that fourth graders produce adjective, noun, and adverb clauses all with ease and fluency, even though they do not produce as many as older students. An investigation to see whether fourth graders avoided clauses in which relative pronouns or interrogative pronouns function as something other than the subject of their own clause indicated that younger grades did not avoid such structures any more than older grades did.

6. Though the small special classes of subordinate clauses appear too infrequently in this study to justify saying that any of them indicates maturity, some of those which do increase might be found in a larger sample to be statistically significant marks of maturity.

7. In counting subordinate clauses, direct quotations after a verb like *say* were noted as a special category of noun clause. However, no handling of direct quotations is quite satisfactory in a developmental study which seeks to say something about difficulty of structure. For instance, if the dialog continues with short speeches involving several changes of speaker, the *John said* or *Mary said* is likely to disappear after the first exchange, leaving the paragraphing to show that the speaker has changed. When that occurs, do the speeches stop being noun clauses? Or suppose the speech is several sentences long. After the first period, is the next sentence a subordinate noun clause? Think what a long enclosed narrative by Conrad's Marlowe would be.

There is a simple solution. Exclude from the writing sample all sentences containing direct discourse. These can be analyzed separately. Exceptions could be made for special reasons as was done in handling *Macomber* in 4-12.

If these thousand word samples from each school child had not included their sentences with direct discourse, then the tendency for the number of subordinate clauses to increase would have been a little more pronounced, since the direct discourse was written predominantly by the younger students.

Macomber and *Barn-Burning*, where sentences containing direct discourse were excluded, showed few noun clauses per T-unit, .11 and .12 respectively, fewer than were written by fourth graders.

It might also be convenient in subsequent studies to keep separate from the main sample all imperatives, since they show no subject, and answers to questions. And, if answers are being separated, perhaps questions should be too.

As a matter of fact, the tabulation of certain other noun clauses also presents a problem. In this study "Pope believed" was counted as a main clause whether it appeared initially, or medially, or finally, in these sentences: "Pope believed man's chief fault is pride" or "Man's chief fault, Pope believed, is pride" or "Man's chief fault is pride, Pope believed." There exists, of course, a structural difference between the initial usage and the medial or final usage. "That" can be used in one instance but not the other; and so can the tag question "didn't he?" Perhaps in medial or final position, "Pope believed," like "I think," "I guess," should have been classed as a sentence modifier of a main clause. However, the problem appeared rarely enough that a different procedure would not have affected the results in any significant way.

8. Taking the scores for all students together, T-unit length correlates significantly with the number of adjective clauses (.615), but not significantly with the number of noun clauses (.239). Sentence length fails to correlate significantly with either adjective or noun clauses.

The contingency coefficient for adjective clauses is .389.

CHAPTER 6. FINDINGS: COORDINATION INSIDE T-UNITS

6-1. The Plan for the Following Chapters

Already we have seen that the clauses written by successively older grades are successively longer and almost three fourths of the gain is from grades 4 to 8. In the following chapters we will look inside those clauses to see, if we can, what it is that older students do to make their clauses longer.

We will look at various parts of a clause one part at a time, searching for developmental tendencies that contribute to clause lengthening.

6-2. Coordination inside T-units

Already we have seen that fourth graders use more than three times as many coordinating conjunctions between main clauses, or, more properly, between T-units, than twelfth graders do. If we should now find that the trend is reversed inside T-units, and that older students use more coordinations there, then this fact would help explain why older students have longer clauses and T-units.

That possibility was investigated. The question was first asked "On how many occasions does each student coordinate two or more elements in his T-units?" The answer (given, for each student, in Table 32) is that the range of performance of students from grade to grade is fairly uniform.

Among fourth graders the range is from 11 occasions to 31; for the eighth grade, if we exclude two exceptional individuals who used 46 and 43, the range is from 16 to 28; twelfth graders range from 17 to 38. The percentage of twelfth grade performance is 93 percent, 112 percent, 100 percent. Eighth graders use coordination on more occasions than the other students do. A graph would go up rather decidedly, then down half way.

Next a check was made to see whether the number of elements coordinated together on these various occasions were roughly the same for each grade. It turned out to be 2.2, 2.3, 2.1. Eighth graders again have a slight edge. Usually two elements are coordinated with an *and* between, though each grade used a wide variety of different

Table 32 — Number of Occasions for Coordination inside T-units

Grade 4		*Grade 8*		*Grade 12*	
Student number	*Number of times coordination was used*	*Student number*	*Number of times coordination was used*	*Student number*	*Number of times coordination was used*
Boys		*Boys*		*Boys*	
4-1	15	8-1	25	12-1	19
4-2	16	8-2	27	12-2	17
4-3	24	8-3	27	12-3	19
4-4	27	8-4	43	12-4	23
4-5	11	8-5	16	12-5	28
4-6	14	8-6	28	12-6	18
4-7	29	8-7	46	12-7	33
4-8	27	8-8	22	12-8	18
4-9	13	8-9	24	12-9	20
Group total	176	Group total	258	Group total	195
Girls		*Girls*		*Girls*	
4-10	25	8-10	21	12-10	38
4-11	18	8-11	21	12-11	24
4-12	30	8-12	27	12-12	22
4-13	24	8-13	24	12-13	29
4-14	24	8-14	23	12-14	26
4-15	25	8-15	28	12-15	27
4-16	19	8-16	25	12-16	20
4-17	21	8-17	28	12-17	22
4-18	31	8-18	20	12-18	20
Group total	217	Group total	217	Group total	228
Grade total	393	Grade total	475	Grade total	423
	93%		112%		100%

patterns (Table 33). The eighth grade used a slightly wider variety, and the twelfth grade the smallest variety. Generally speaking, we can devote our attention to the number of occasions when each grade used coordination. We need not be worried about differences in the number of items coordinated on those occasions: in all likelihood the number is 2.

The question was also asked, "Is there a significant difference in the kinds of grammatical elements which are coordinated? Is there, for instance, a shift away from the coordination of subjects to the coordination of verbs, or the reverse?" The results of that inquiry

Table 33 — Patterns Used as Structures of Coordination

	Grade 4			Grade 8			Grade 12		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
X and X	132	176	308	169	156	325	142	154	296
X or X	4	8	12	24	16	40	23	33	56
XX and X	4	10	14	13	7	20	7	14	21
X and X and X	15	5	20	7	6	13	4	1	5
X but X	6	5	11	2	6	8	5	8	13
XX	3	2	5	5	5	10	3	1	4
XXX		2	2	6	5	11		2	2
XXX and X	2	4	6	5	3	8	1	3	4
either X or X				4		4		1	1
X then X		1	1	1	1	2		1	1
X and X and X and X	2		2	1	1	2	1		1
X and X, X and X	1		1	3		3			
XX or X				2		2	1	1	2
X and XX	1		1	1	1	2	1		1
X and X or X				1	1	2		1	1
X instead of X					3	3			
XXXX and X				2	1	3			
X as well as X							1	2	3
XXXX	1	1	2						
XXXXXXX	1		1	1		1			
XXXXXXXXXX					2	2			
both X and X				1		1		1	1
rather X than X								2	2
X and X but X							2		2
not X but X							1	1	2
X and X and X or X				2		2			
X so X		1	1						
X and XX, X and X		1	1						
X and X, X and X, X and X	1		1						
X and X and X and X and X	1		1						
X and X and XXXXX					1	1			
X, XX and XX				1		1			
XXXXX and X		1	1		1	1			
X or X, X and X				1		1			
X or X or X	2		2				1		1
X then X and X				1		1			
not only X but X					1	1			
XXXXXX				1		1			
XX and XXX and X				1		1			
X and X, X or X				1		1			
X or XXXX				1		1			
X and X and then X then X				1		1			
XXXX and X and X								1	1
X then X then X								1	1
X and X both							1		1
XX etc.							1		1
Totals	176	217	393	258	217	475	195	228	423
Number of different patterns			20			31			22

Table 34 — Number of Occasions When Certain Grammatical Elements Were Coordinated inside T-units

	Grade 4		*Grade 8*		*Grade 12*	
	No. of occasions	*No. of occasions per clause*	*No. of occasions*	*No. of occasions per clause*	*No. of occasions*	*No. of occasions per clause*
No. of occasions when nominals were coordinated as *subjects*	74	.027	46	.021	31	.015
No. of occasions when *verbs* were coordinated within finite verb phrases	188	.069	163	.072	123	.058
No. of occasions when nominals were coordinated as *direct objects*	57	.021	55	.025	67	.031
No. of occasions when nominals were coordinated as *objects of a preposition*	19	.007	52	.023	34	.016
No. of occasions when *predicate adjectives* were coordinated	4	.001	28	.015	23	.011
No. of occasions when *predicate nominals* were coordinated	9	.003	17	.008	15	.007
Total	351	.133	361	.16	293	.14
No. of occasions when *other* elements were coordinated*	42		114		130	
Total	393 (93%)		475 (112%)		423 (100%)	
No. of coordinations per T-unit	.18 55%		.30 92%		.33 100%	

*This category will include coordinated adverbs, adjectives, etc. It will also include a very few subordinate clauses coordinated together (when I have time and if I have the money . . .); consequently not all these elements are *within* clauses.

appear in Table 34, where separate counts are given for the total number of elements and for the number of elements per clause. Certain shifts do appear, but in view of the small number of instances, the tendencies should be interpreted only with caution. The overall tendency is clear: the number of coordinations per T-unit increases decidedly from fourth to eighth grade and then levels off. This tendency will be examined in more detail in the next section.

6-3. Reducing Coordinated T-units to Coordinated Elements within One Clause

Coordinated subjects, verbs, etc., may be regarded as coordinated T-units with the elements common to both T-units deleted. Actually fourth graders miss many opportunities to carry out just such consolidation.

In the fourth grade passage "We run away to my house and we play with my train," the *we* which is subject of both clauses could well be deleted, producing "We run away to my house and play with my train."

Here two clauses each 6 words long could become one clause 11 words long. The *and* would cease to stand between T-units and would be shifted inside a T-unit. One clause would be reduced to a nonclause and would be consolidated inside a second clause.

Here are other examples where the same student missed other similar opportunities to consolidate two short clauses into one, using coordination.

> *We* go up to my tree house. *And we* make plans to spy on the girls.
> (We go up to my tree house and make plans to spy on the girls.)
> *I* played pick up sticks *and I* looked at the game.
> (I played pick up sticks and looked at the game.)
> *You* get hot *and you* want to go in.
> (You get hot and want to go in.)
> *He* tried to get out *but he* couldn't *get out.*
> (He tried to get out but couldn't.)
> *I like to* run *and I like to* kick balls.
> (I like to run and kick balls.)

In every example above, the revision has shifted a coordinator between clauses—here, between single-clause T-units—to a coordinator inside a clause. If this revision had been made each time the opportunity arose, the number of coordinators between T-units would have been considerably reduced for fourth graders, and the number inside

T-units would have been correspondingly increased. The average length of the T-units would have been increased too.

The fact that eighth graders use more coordinations inside T-units than even twelfth graders do, suggests that learning to consolidate by means of coordination is a concern between grades 4 and 8, but that after grade 8 students have mastered this problem and so shift their attention more to other methods of consolidation.

Here, and at many points in the other chapters, one is tempted to attribute to younger students a "limited span of grammatical attention or concern." The fourth grader is entirely capable of coordinating two predicates that have the same subject. In fact he does it often. But he does not attend to the relations between one clause and another to the extent that older writers do. He misses chances to do what he can do.

6-4. Summary on Coordination

In Chapter 3 we saw that the number of coordinators used between T-units decreases dramatically from grade to grade: from 574 to 284 to 172. We have just now noted a few of the many occasions where fourth graders missed opportunities to consolidate T-units by deleting common elements and moving the coordinator inside the T-unit. Apparently eighth graders have learned not to miss those opportunities; anyway, they find more occasions, they use more elements per occasion, they use a wider variety of patterns.

Perhaps eighth graders have learned nearly all they ever will learn about consolidating through coordination. Anyway twelfth graders use coordination less than eighth graders. They use less between T-units and less within T-units. Perhaps, between grades 8 and 12, students shift their attention away from coordination and concentrate on other ways of consolidating clauses into slightly longer clauses. The other ways may take the place of a certain amount of coordination.

Some of those new ways to consolidate are the subject of the next chapter.

CHAPTER 7. FINDINGS: NOMINALS WITHIN T-UNITS

7-1. The Plan for This Chapter

The term nominal is used here to designate any of the structures that function as subject of a verb, or as direct object, predicate nominal after a copula, object of a preposition, etc. A noun plus its adjoining modifiers is a nominal, but predicate adjectives, for example, are not part of the subject nominal. Predicate adjectives are treated in Chapter 11. The noun which is modified is the head of the whole nominal structure.

The first part of this chapter will look at unmodified nouns and the various modifiers of nouns.

The second part of the chapter will look at nominalized verbs and clauses: at noun clauses, infinitival nominals, and gerunds.

Finally the complexity of nominal structures will be discussed.

7-2. The Purpose for This Chapter

To be English, a clause must contain a nominal as subject, and a finite verb, and, depending on the kind of verb used, various objects and complements, etc. Those are the minimum essentials required by the language.

There are also nonessential elements, and among these are modifiers of nouns. If older students use more of them, their nominals will be longer, and their clauses will tend to be longer too.

So one reason to check the number of noun modifiers is to see whether an increase exists which would help to explain the lengthening of clauses.

Unmodified Nouns and Modifiers of Nouns

7-3. The Commonest Nominals

The expressions most frequently used as nominals by each grade are found to be either single-word nominals or nominals consisting of a single word plus an article, or a single name like *John* or *John Smith*. That is, they are (1) proper nouns, (2) common nouns, and (3) personal pronouns, all by themselves without modifiers.

The forms mentioned here are the simplest nominals, and the youngest students used the largest number of them: 3,865, 3,045, 2,507. In percentage the decrease is from 154 percent to 121 percent to 100 percent. The difference is significant for grade at the .01 level and for the interaction of sex and grade at the .05 level (Table 35).

Table 35 — Frequency of Unmodified Nouns and Pronouns

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Common nouns	737	634	1371	654	593	1247	492	654	1146
Proper nouns	315	397	712	191	351	542	208	128	336
Personal pronouns excluding *it*	882	736	1618	520	571	1091	410	519	929
It as personal pronoun	94	70	164	101	64	165	39	57	96
Total			3865			3045			2507
			154%			121%			100%

The number of unmodified nouns and pronouns used by each student was subjected to analysis of variance, 2 × 3 factorial. The significance was found to be at the .01 level for grade and .05 level for the interaction of sex and grade.

Among these simplest nominals there are differences which reflect the choice of subject matter by the youngest students. The fact that fourth graders usually wrote about people or animals with names they knew accounts for the fact that they used decidedly more proper nouns (712 as compared with 542 and 336). That same choice of subject matter possibly explains why they used more personal pronouns. Excluding the nonanimate *it*, they used 1,618 personal pronouns as compared with 1,091 and 929. Including pronoun *it* (but of course not the expletive *it*) the count is 1,782, 1,256, 1,025.

As one studies the writings from the different grades, he gets the impression that one reason younger students use more personal pronouns is that they tend to express themselves in short clauses and so need to carry the same noun reference from clause to clause, using pronouns for that purpose. Older students seem to consolidate those same meanings into longer clauses, reducing many of their clauses to modifiers of a single noun (as will be seen in more detail later in this chapter), and so they do not need to carry that noun from one clause to another in the form of a personal pronoun. Such an impression cannot be "proved" by this kind of study, of course, but, in any event, the number of personal pronouns, including pronoun *it* (but of course not expletive *it*), correlates highly and negatively (−.769) with clause length and has a contingency coefficient of .464.

The number of unmodified common nouns correlates −.384 with clause length and has a contingency coefficient of .389.

7-4. Who Uses the Most Adjectives?

The noun modifiers most commonly used by all grades were adjectives. What are here called adjectives are only those words that can serve as predicate adjectives. Articles, demonstratives, genitives, numerals, etc., are not here counted among adjectives.

The number used by each grade was 554, 895, 917. In percentage the increase was from 60 percent to 98 percent to 100 percent. The increase was significant for grade only, and at the .01 level, by an analysis of variance. The number of adjectives correlated significantly (.547) with clause length for all students. The contingency coefficient was .370.

7-5. Who Uses the Most Genitives as Modifiers?

After adjectives, the next commonest modifiers of nouns were other nouns in the genitive form. Genitive inflections may be added to nouns (the *neighbor's* cat) and to pronouns (*my* dog). In addition, the phrasal genitive with *of* is commonly used with nouns (the floor *of the room*) and less commonly with pronouns (that car *of yours*). The total of both inflected and phrasal genitives for both nouns and pronouns increases slightly with successively older grades, though the main increase is late, between eighth and twelfth grades. The totals of inflected and phrasal genitives for each grade are 632, 652, 809; in percents 78 percent, 81 percent, 100 percent (Table 36). The increase is significant for grade only and at the .01 level, according to an analysis of variance.

If we start keeping a running total of modifiers, we find that each successively older grade is substantially ahead of the younger grade. The totals for all adjective and genitive modifiers are 1,186, 1,547, 1,726.

The fact that the phrasal genitive with *of* increases while the inflected genitive of pronouns decreases may be due to the effect of two phenomena: (1) that fourth graders use an especially large number of personal pronouns whereas older students use nouns instead;

and (2) that pronouns are more likely to take the inflected genitive whereas nouns are more likely to take the phrasal genitive, as was shown by C. C. Fries, in *American English Grammar* (p. 72 ff.).

Table 36 — Number of Inflected Genitives and Phrasal Genitives with Of

	Grade 4			Grade 8			Grade 12		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Personal pronouns in genitive	192	220	412	110	135	245	142	182	324
Nouns in genitive	40	51	91	27	28	55	46	29	75
Of followed by a nominal	57	72	129	195	157	352	226	184	410
Totals			632 78%			652 81%			809 100%

The number of genitives used by each student is significant for grade only and at the .01 level.

The genitive, either inflected or phrasal, indicated possession less than half the time in Fries's Standard English material. It frequently is a nominalized version of a subject-verb, verb-object, subject-object expression. The number of genitives correlated significantly (.396) with clause length.

7-6. Who Uses the Most Prepositional Phrases as Modifiers of Nouns?

The third most frequent modifiers of nouns are prepositional phrases other than phrases with *of*. About half of them for each grade indicated place.

They are used more frequently by successively older grades, the number of occurrences being 133, 229, and 318. In percents the increase is 42 percent, 72 percent, and 100 percent. The frequency doubles over our time span, and the increase is roughly equal in the early and late periods (Table 37). The increase is significant for grade only and at the .01 level.

For each grade there are just about as many phrases with *of* as with all other prepositions combined.

The number of prepositional phrases correlates significantly (.567) with clause length, for all students. The contingency coefficient is .481.

Our running total for modifiers of nouns now stands at 1,319, 1,776, 2,044.

7-7. Who Uses the Most Adjective Clauses and Noun Adjuncts?

After prepositional phrases, the next most frequent modifiers of nouns at the various grades are either noun adjuncts or adjective

Table 37 — Prepositional Phrases Used to Modify Nouns

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Phrases indicating place	39	35	74	74	45	119	47	60	107
Phrases not indicating place, purpose or time									
for	5	5	10	17	18	35	20	12	32
on	2	3	5	1	2	3	28	16	44
with	5	8	13	6	7	13	7	10	17
to	6	1	7	—	4	4	14	12	26
about	4	8	12	6	7	13	8	7	15
in	1	—	1	1	2	3	11	12	23
as	—	—	—	1	7	8	5	5	10
like	2	—	2	2	3	5	5	1	6
except	1	5	6	3	3	6	4	2	6
from	1	—	1	—	2	2	3	2	5
against	1	—	1	—	1	1	1	2	3
between	—	—	—	—	—	—	—	1	1
after	—	—	—	—	—	—	3	1	4
out of	—	—	—	4	5	9	—	—	—
similar to	—	—	—	—	—	—	—	1	1
toward(s)	—	—	—	—	2	2	1	1	2
by	—	—	—	—	1	1	1	—	1
besides	—	—	—	—	—	—	1	—	1
before	—	—	—	—	2	2	—	—	—
along with	—	—	—	—	1	1	2	—	2
instead of	—	—	—	—	—	—	2	—	2
over	—	—	—	—	—	—	1	—	1
upon	—	—	—	—	—	—	4	—	4
at	—	—	—	—	—	—	1	—	1
Other phrases	1	—	1	1	1	2	3	1	4
Total	68	65	133	116	113	229	172	146	318

The number of prepositional phrases (not including phrases with *of*) is significant for grade at the .01 level.

clauses. Since adjective clauses have already been discussed in an earlier section, only their frequency here need be mentioned. In our eight year span they more than double. The increase is about the same from grade to grade. Their frequency is 96, 144, 210. The percents are 46 percent, 68 percent, 100 percent.

We will keep a running total of only nonclause modifiers, and add in the clause modifiers last.

Whether a student will use an uninflected noun to modify another noun, thus producing a noun adjunct or compound like *art' lesson* or *apple pie'*, is not a matter of personal choice in the same way that the use of most modifiers is. A child probably learns many such expressions as single names of things. It should not be surprising, then, that the frequency of this structure fluctuated from grade to grade, depending on factors which have nothing to do with maturity. The frequency is 157, 205, 127. The decline from grade 8 to 12 is marked.

Our running total of nonclause modifiers is now 1,476, 1,981, 2,171.

7-8. Who Uses the Most Verb Forms as Modifiers of Nouns?

Verbs, and often whole predicates, can become modifiers of the same nouns which can be their subjects or objects. Instead of having finite verb endings, such verbs are infinitives, present participles, or past participles. A single-word verbal will sometimes precede the noun, but multi-word verbal modifiers regularly follow the noun.

The frequency of these structures is shown in Table 38.

Again the number of such modifiers increases with successively older grades. The numbers are 100, 162, 192. The percentage increases from 52 percent to 84 percent to 100 percent. The frequency nearly doubles over our time span.

Table 38 — Verb Forms Used as Modifiers of Nouns

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Infinitives	6	8	14	9	21	30	34	25	59
Past participles	19	37	56	23	32	55	29	40	69
Present participles	8	22	30	31	46	77	41	23	64
Total			100			162			192
% of Grade 12 frequency			52%			84%			100%

The running total of nonclause modifiers now stands at 1,576, 2,143, 2,363.

7-9. Single-word Expressions of Place as Modifiers of Nouns

A sprinkling of single-word expressions of place appeared as modifiers of nouns (the family *upstairs*, the fountain *there*). For the three grades there were only 6, 4 and 4. They bring the final total of nonclausal modifiers to 1,582, 2,147, 2,367.

7-10. Where Do the Modifiers of Nouns Come From?

The fact that older students use more modifiers of nouns may encourage either of two pictures of students' development. One picture is that older students in some way think up more attributes to nouns, whereas young students do not think of many, or at least do not write them down.

An alternate picture is that what younger students have to say could be said using modifiers of nouns but instead is said in other structures, particularly structures requiring whole clauses with subjects and finite verbs.

This study cannot prove definitively the appropriateness of either picture, but it can lend plausibility and detail to the second picture.

A great many meanings which can be expressed in short simple clauses can also be expressed without the use of a full clause at all. For instance, a predicate adjective and an intensifier after a form of *be* (The whale was very strong) can become a modifier of the noun which is subject of the clause (very strong whale) if that same noun appears in an adjoining clause. ("Moby Dick was a whale. The whale was very strong" becomes "Moby Dick was a very strong whale.")

Important to this study is the effect of rewriting two clauses as one clause with a modifier. That process involves the reduction of one whole clause (the whale was very strong) to a nonclause structure (very strong whale), in this instance a modifier of a noun. The subject-predicate relation disappears, and so one clause ceases to exist. The modifier is shifted to another clause. In effect, two clauses have been consolidated into one.

Note the effect of this reduction and consolidation on our statistics. Originally no "modifier of a noun" appeared in either clause. Now one does, an adjective modified by an intensifier. Originally we had two clauses averaging 4½ words long (counting *Moby Dick* as one word).

Now our average clause length (for one clause) is 6 words. This gain of 1½ words in average clause length is exactly the amount of gain that occurs, on the average, between fourth and eighth grades.

There is another far more impressive gain, however, to be seen in this example. That is the gain in succinctness. What was said originally in 11 words is said, as a result of consolidation, in 6 words. Almost half the original wordage was waste. If that kind of gain in succinctness continues over the years, then the amount of meaning expressed, on the whole, in a thousand words of twelfth grade writing will be many times that expressed in a thousand words of fourth grade writing.

We need not suppose that the older student thinks in short simple clauses which he then revises, consolidating them into longer and longer clauses and longer and longer T-units. There is, however, good reason to believe that when he was younger he thought in those terms. At least we can be sure that he wrote in those structures. It takes him many years to learn to write—perhaps to learn to think—in terms of longer clauses and T-units with vastly more intricate relationships in each one. We cannot see the process of consolidation at work, but we can see the results of it over the years. The older student seems to have a wider span of grammatical concern.

7-11. Examples of Clauses to Be Reduced and Consolidated

Younger writers miss many opportunities to reduce a clause to a nonclause modifier of a noun in an adjoining clause.

The previous section, exhibiting a fourth grade example, showed how a clause with a predicate adjective can be reduced to a single modifier. Older writers do not miss those opportunities so often.

Genitives are related to a great number of other clause structures. The "possessive" genitive relates two nouns as they would be related in a subject-object sentence with *have*, or *possess* or *own*, etc. "*Jim* has (or *owns*, or *possesses*) a *bicycle*" is related to "*Jim's bicycle*." Similarly the fourth grade passage "We have a lot at Lake Talquin the lot has a dock on it" can be reduced to "*Our* lot at Lake Talquin has a dock on it."

Various prepositional phrases modifying nouns are related to full clauses. Thus the two T-units given above could also be reduced to "We have a lot at Lake Talquin *with* a dock on it." The two T-units "Today we went to see a film. The film was *about* a white-headed whale" could be consolidated into "Today we went to see a film *about* a white-headed whale." "The jewel was *in* the drawer. It was red" can become "The jewel *in* the drawer was red."

Past participles modifying nouns usually are related to clauses in which the noun is subject of a passive verb. Thus the two T-units "Tommy wanted to let his goat be in the circus. His goat was *named* Whiskers" can be consolidated into "Tommy wanted to let his goat *named* Whiskers be in the circus." "Today we had a visitor. His name was Mr. Parr" could become "Today we had a visitor named Mr. Parr." "Beautiful Joe was a dog, he was born on a farm" could become "Beautiful Joe was a dog born on a farm."

Present participles modifying nouns are often related to clauses in which the noun is subject of the verb. "One colt was *trembling*. It was lying down on the hay" can be consolidated into "The *trembling* colt was lying down on the hay" or "The colt *lying down on the hay* was trembling."

Infinitives modifying nouns are related to clauses in which the noun is related to the verb in any of several ways. "They made him a fire engine. The king *rode* in the fire engine all day" can be consolidated into "They made him a fire engine [for him] *to ride* in all day."

No fourth grader produced so long and complex a modifier as this eighth grader's infinitival: "I liked the different faces *to express the feelings of the characters and the mood which they were in.*" It was a twelfth grader who produced this nonrestrictive present participial modifier: "But the captain, *being such a monstrous and gigantic man bent on revenge,* kept the crew going."

Eighth graders consolidate more than fourth graders do, yet in an eighth grade passage like the following the opportunity for further consolidation is still apparent: "Moby Dick was a dangerous whale. People had never been able to catch him [that people had never been able to catch]. He was a rare white whale with a crooked jaw. He was a killer too, he was long and strong [He was a killer too, long and strong]. This is what Moby Dick was."

7-12. Conclusions on Nouns and Their Modifiers

The synopsis of clause-to-sentence factors indicated that the clauses written by older students tend to be longer. In this chapter we have searched for an explanation of that fact by asking if the nominals written by older students tend to be longer because they contain more modifiers. The answer is Yes.

It was also shown that younger students often miss opportunities to reduce a whole clause to a single modifier which would then be consolidated inside an adjoining clause. In this way they miss opportunities to reduce the number of "short" T-units, and achieve greater conciseness.

1. It is the younger students who use a larger number of the simplest nominals: unmodified common nouns, personal pronouns, and proper nouns. The number is 3,865, 3,045, 2,507. In percents the decrease is from 154 percent to 121 percent to 100 percent.

2. Older students write substantially more adjectives, more genitives, more prepositional phrases, more infinitives, more participles, as modifiers of nouns. The totals of all nonclause modifiers are 1,582, 2,147, 2,367. That means that the average number of them per clause for the three grades is .6, .95, 1.1. In percentages that is 55 percent, 86 percent, 100 percent. The number per clause nearly doubles (Table 39).

3. Though the increase in number of adjective clauses will not affect clause length, the clauses should be mentioned in connection with the increased number of modifiers of nouns.

As we saw in Chapter 5 adjective clauses do increase very significantly with grade—more significantly than any other kind of subordinate clause. They are a most significant factor in the increase of T-unit length. The number of them per T-unit increases nearly fourfold, from .044, to .09, to .16.

4. The number of nonclause modifiers in 2 above is ten to fifteen times as great for each grade as the number of clause modifiers in 3 above.

When a main clause is reduced to a subordinate adjective clause and consolidated with another adjoining clause, the T-unit length is approximately doubled. But no greater conciseness is achieved.

However, when a clause is reduced to a nonclause modifier (an adjective or a prepositional phrase of place, for instance), the average T-unit length is increased only slightly, but the gain in conciseness is considerable because so many words are deleted.

In summary, then, adding clausal modifiers is more effective as a means of lengthening T-units, but adding nonclause modifiers is more effective in achieving conciseness. Apparently the two go hand in hand developmentally, with nonclause modifiers greatly outnumbering clausal modifiers, especially in the early period. Length must indeed

Table 39 — Summary of Modifiers of Nouns

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Adjectives	259	295	554 60%	486	409	895 98%	489	428	917 100%
Genitives (from Table 36)	289	343	632 78%	332	320	652 81%	414	395	809 100%
Prepositional phrases (from Table 37)	68	65	133 42%	116	113	229 72%	172	146	318 100%
Noun adjuncts	78	79	157	161	44	205	45	82	127
Non-finite verbs (from Table 38)	33	67	100 52%	63	99	162 84%	104	88	192 100%
Single-word expressions of place	—	6	6	—	4	4	3	1	4
Total of nonclauses	727	855	1582 67%	1158	989	2147 90%	1227	1140	2367 100%
No. per clause			.6			.95			1.1
No. per T-unit			.74			1.54			1.86
Adjective clauses (from Table 31)	42	54	96 46%	74	70	144 69%	113	97	210 100%
No. per T-unit			.044			.09			.16
Total of clauses and nonclauses	769	909	1678 65%	1232	1059	2291 89%	1340	1237	2577 100%

be some index of conciseness insofar as it is an index of the amount of clause consolidation. Redundancy must be greatly reduced from grades 4 to 8.

5. Average clause length correlates significantly with several kinds of noun modifiers: with adjectives (.547), with genitives (.396), with prepositional phrases (.567), with infinitives (.431), and present participles (.278). The correlation of clause length with the number of pronouns and unmodified nouns is high and negative (−.839).

The contingency coefficients for various noun modifiers are these: adjectives .370; genitives .520; prepositional phrases .481; infinitives .368; past participles .369; present participles .336.

Nominalized Verbs and Clauses

Already we have seen that whole clauses, noun clauses, can be used as nominals.

There are other nominals which are very much like whole clauses: they can contain all the objects and all the modifiers and the complements of the verb that a clause could contain. Furthermore, sometimes the noun which would be subject of the verb appears too. The essential difference between noun clauses and these "near-clauses" is that the verb in the "near-clause" is not finite. Either it is an infinitive with *to* or a gerund with *-ing*.

7-13. Interrogative Infinitival

A special kind of infinitival nominal contains an interrogative word: "*how to get* to the airport," "*where to put* his skates," "*who*(m) *to give* it to." This structure, here called the interrogative infinitival, was the least common of "near-clause" nominals. It was produced only 18 times, 6 times, and 5 times by the three grades.

7-14. Factive Infinitival

An infinitival without an interrogative is here called factive, following Lees. A fourth grade example is "The real object of the game was *to hit the other team's supply of ammunition*, etc." Factive infinitivals were produced 87 times, 100 times, and 143 times. In percentages the increase is from 61 percent to 70 percent to 100 percent. The difference is significant for grade only and at the .01 level, by an analysis of variance.

7-15. Gerund

The gerund nominal with *-ing* was used rarely by fourth graders but very commonly by twelfth graders. The numbers produced were 14, 56, 141. In percentages the increase is 10 percent, 40 percent, 100 percent. No other structure increases so dramatically from grade to grade. The significance is for grade only and at the .01 level, by an analysis of variance.

7-16. Sample "Near-clauses" Produced by Students

It is difficult to point to specific passages where younger students missed opportunities to reduce one clause to an infinitival or gerund. Occasionally *this* or *it* or *this problem, this action, this attitude,* or some other abstract noun refers back to a whole clause which might have been nominalized. Thus the two eighth grade clauses "In time the overhead trains were used *and it* helped" might have been rewritten "In time, using overhead trains helped."

The nominalizing tendency which is so strong among older writers often changes the verb to a cognate noun, however, not to a verb with *-ing* or *to.* Thus the sentence given above might have been rewritten "In time, the *use* of overhead trains helped." Such a nominalization would not have been observed by the procedure used in this study except that the *of* phrase would have been counted as a modifier.

One way, however, to show the growing reliance on such nominals is to show all of a certain sort, selected narrowly enough that the list does not become too long. With that purpose, the following list restricts itself to gerunds used as subjects.

No fourth grader used a gerund as subject of a clause. Only two out of eighteen eighth graders used any.

8-14 The firing on Fort Sumter . . . (used twice)
My screaming or yelling could not stop them . . .
8-18 All this adding means more work to be done.

However, six out of eighteen twelfth graders used the gerund as a subject.

12-1 This questioning of a belief or proposition . . .
The questioning of an established belief . . .
The silencing of an individual . . .
This stopping of men from thinking the truth . . .
12-4 Using still scenes . . .
There are other limitations, such as speaking for the overthrow of the government, inciting a riot. (*speaking* and *inciting* are not actually the subject)
12-8 The showing of pictures and a narrator reading the story seems to hold my interest . . .
12-13 Learning the basic rules of grammar verbatim . . .
12-14 Presenting a unit on sentence structure . . .
Accepting and not going beyond or trying to give answers . . .
12-17 Having to write a paper on the movie . . .
Writing themes is . . .

The fact that five of the nine students who used the structure once used it also at least a second time suggests that once a student has learned to produce it he discovers opportunities to do so.

7-17. Appositives

Appositives are of two sorts, one restrictive, the other nonrestrictive. Examples are "my friend Helen" and "John Milton, author of *Paradise Lost*." Fourth graders used about as many restrictive appositives as did older students, but less than half as many nonrestrictive appositives as did eighth and twelfth graders (Table 40). The totals were 35, 58, 62. These figures are not included with any of the other totals in this study.

Table 40 — Restrictive and Nonrestrictive Appositives

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Nonrestrictive appositives	10	10	20	20	26	46	28	15	43
Restrictive appositives	5	10	15	8	4	12	10	9	19
Total	15	20	35	28	30	58	38	24	62

7-18. Summary on Near-clauses

1. These three "near-clause" nominals, taken together, increase very substantially with successively older grades. They appear 119, 162, and 289 times. In percentages the increase is from 41 percent to 56 percent to 100 percent. The main part of the increase appears late. However, they are too infrequent to have a major effect on clause length.

2. "Near-clause" nominals are more distinctly indicative of maturity than are noun clauses, though they appear with only about half the frequency.

The total of noun clauses and "near-clause" nominals for the three grades is 411, 409, 660. (A summary of the frequency of these nominals appears in Table 41).

3. For all students, clause length correlates significantly with the number of gerunds (.557). T-unit length correlates significantly with the number of gerunds (.660) and with the number of infinitival nominals (.368).

The contingency coefficient for factive infinitivals is .391, and for gerunds .469.

Table 41 — Summary of Nominalized Verbs and Clauses

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
"Near-clauses"									
Infinitival nominal	45	42	87	48	52	100	68	75	143
Gerundive nominal	7	7	14	26	30	56	65	76	141
Interrogative infinitival	10	8	18	2	4	6	3	2	5
Subtotal	62	57	119	76	86	162	136	153	289
Percent			41%			56%			100%
No. per clause			.043			.072			.136
Noun clauses									
that or ϕ, etc.	43	68	111	52	72	124	129	136	265
indirect question	24	51	75	48	32	80	49	39	88
Subtotal			186			204			353
direct discourse	30	76	106	8	35	43	6	12	18
Subtotal	97	195	292	108	139	247	184	187	371
Total nominalized verbs and clauses	159	252	411	184	225	409	320	340	660
Total modifiers	769	909	1678	1232	1059	2291	1340	1237	2577
Total	928	1161	2089	1416	1284	2700	1660	1577	3237
No. per T-unit			.98			1.70			2.54

The number of infinitival nominals for each student is significant for grade at the .01 level. The same is true for the number of gerunds.

The Complexity of Nominals

7-19. The Number of Modifiers per Noun

As one reads analytically the writings of the three grades, he gets the impression that older students not only produce more modifiers but also attach more modifiers to a single head. For instance, one fourth grader wrote "Dick was Billy's brother Dick was younger than Billy." An older writer would probably attach both the possessive and the predicate adjective to the same noun so as to produce "Dick was Billy's younger brother." Thus he would gain in succinctness and in average clause length. Another fourth grader wrote "The two dogs my dogs were chasing the horse." An older writer might have deleted one noun and attached both modifiers to the same noun, producing "My two dogs were chasing the horse." Another wrote "The film was about a white-headed whale who was very big." An older writer might have reduced the adjective clause to a nonclausal structure, producing "The film was about a very big white-headed whale."

It might be worth finding out whether it is more mature to write two modifiers attached to one noun than to write two attached to two nouns. The figures given so far will not answer that question. The second example above shows the same noun written twice, using a different modifier each time. Fourth graders quite often repeat the same noun rather than consolidate structures. Thus we see "Once upon a time I had a *cat*. This *cat* was a beautiful *cat* it was also mean." *Cat* is repeated three times, whereas the three clauses could be consolidated into one containing both adjectives. "Once upon a time I had a beautiful but mean cat" or "who was beautiful but mean."

Fourth graders seldom produced as many modifiers for a single noun as appear in these expressions by eighth graders: "a rare white whale with a crooked jaw," "a big, strong white whale," "a short, fat, dull-looking man."

7-20. A Method for Counting "Complexity" of Nominals

An attempt was made to objectify, verify, and test for significance this impression that older students use a larger number of modifiers attached to a single head. Length in words was not wanted, for a prepositional phrase as modifier is usually at least three words long, and so, in words, would count as much as three adjectives, and that would be undesirable. So a count of 1 was given for each occurrence of each kind of modifier. A count of 4 was given for "a (1) rare (2) white whale (3) with a (4) crooked jaw," one count being given for each of the adjectives *rare* and *white*, one for the prepositional phrase, and one for the adjective *crooked* modifying the nominal in that phrase. No count was given for *whale*, the noun head.

However, modifiers were not all that were counted. We have seen that older students write more nominalized verbs and clauses. So the count of 1 was given also for each occurrence of these. Thus "(1) his (2) advocating the overthrow (3) of the government" was given the count of 3: one for the genitive *his*, one for the nominalized verb *advocating*, one for the *of* phrase.[1]

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[1] A more exact way to measure complexity might be to count the number of sentence-combining transformations needed to produce such nominals from terminal strings. However, such a procedure would require arbitrary decisions for the purpose at hand. For instance, "his advocating the overthrowing of the government" is clearly related in deep structure to something like "he + aux + advocate

In summary, then, a nominal was given one count for "complexity" each time any of the following structures appeared in it. "Complexity" is not a particularly happy name for what is counted here. But "expansion" is no better, and "length" is likely to be confused with "word length" used elsewhere.

MODIFIERS OF NOUNS

- Adjectives (with or without attributive adverbs like *very*)
- Single-word adverbs (of place, time, etc.)
- Prepositional phrases
- Non-finite verbs (participles, both present and past; infinitives)
- Inflected genitives
- Prepositional phrases with *of*
- Adjective clauses

NOMINALIZED VERBS AND CLAUSES

- Noun clauses
- Gerund nominals
- Infinitival nominals (interrogative and factive)

7-21. Who Uses the "Most Complicated" Nominals?

To test the hypothesis that the number of "complications" in nominals is an indicator of maturity, each nominal was measured in the fashion indicated. The number of nominals given the count of 1, the number given the count of 2, the number given the count of 3, etc., was then tabulated for each student, each grade, each sex within grade.

The results appear in Table 42. Starting at the bottom, and looking only at the totals for each grade, we see that the 1 nominal given

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+NP," and "NP + aux + overthrow + the + government." Consequently it might be said to result from 2 transformations. However, would "advocating (without his) the overthrow (without the *-ing*) of the government" be given the same count? If so, would "the publication of the work" also be treated as a nominalizing of "NP + aux + publish + the + work"? If so, would the word *publication* alone be counted as a nominalization of a verb? If so, where would one stop?

Other arbitrary decisions would also need to be made. Would a prenominal adjective be treated as the result of one sentence-combining transformation, or three or four? (Clearly it is related to an adjective clause with BE and a predicate adjective.) Would a relative clause be counted as one transformation, or more?

In view of the necessity for such arbitrary decisions and the difficulty of justifying them, this report describes a different procedure which also involves arbitrary decisions, but which nevertheless may be adequate for the purpose at hand and may be more widely understood. The procedure used here is concerned with surface structure. It gives a count of 1 for *overthrowing* but not for *overthrow* or *publication*. It treats inflected genitives as modifiers, and *of* phrases also as modifiers. "Their overthrowing of the government" receives a count of 3, whereas "overthrowing the government" receives a count of 1.

the count of 9 was produced by a twelfth grader. Two nominals were given the count of 8, and again twelfth graders produced both of them. Two were given the count of 7, and again they were produced by twelfth graders only. Nominals given the count of 6 were produced 12 times by the oldest students, but eighth graders put in an appearance now with 3. In the next line, for nominals given the count of 5, even fourth graders appear, but they produce only 3, while the older grades produce 11 and 17. For the next three lines older grades maintain a substantial lead. Only when we get to nominals given the count of 1 does the preeminence of the older grades waver. At the production of nominals given the count of 1, fourth graders can nose out eighth graders. It should be recalled also that they use nouns with no modifiers at all much more often than older students do.

7-22. The Statistical Significance of the "Complexity" of Nominals

For each individual, three sets of scores were obtained. One was simply the total number of counts given to his nominals. A second was the total number of counts given to nominals receiving a count of 2 or more (ignoring all nominals receiving the count of 1 or zero). The third was the total number of counts given to nominals receiving the count of 3 or more (ignoring all receiving the count of 2 or 1 or zero).

These three scores for each individual were then tested statistically. By analysis of variance each of the three measures was found to be significant for grade only and at the .01 level. Each of the three was also found to have a high contingency coefficient, the highest being .66 for "total number of counts given to nominals receiving counts of 2 or more." Contingency coefficients higher than this have been found for only two variables: T-unit length (.694) and number of "short" T-units (.70). We can conclude, then, that the complexity count is one of the best indexes of maturity.

The complexity count also measures factors which relate strongly to the process of lengthening T-units. The "total counts given to all nominals" correlated .772 with T-unit length, and "counts for nominals receiving counts of 2 or more" correlated .769, practically the same. Of the more than 30 variables tested for intercorrelation, only 3 are correlated more highly with T-unit length than is this count. (Those 3 are unmodified nominals −.818, clause length .836, and the ratio of clauses to T-units, .831.)

Table 42 — "Complexity" of Nominals

Number of counts given certain nominals	Grade 4 No. of occurrences of such nominals				Grade 8 No. of occurrences of such nominals				Grade 12 No. of occurrences of such nominals			
	Boys	*Girls*	*All*	*% of Grade 12*	*Boys*	*Girls*	*All*	*% of Grade 12*	*Boys*	*Girls*	*All*	*% of Grade 12*
1	701	833	1534	90%	758	708	1466	86%	820	875	1695	100%
2	100	128	228	50%	216	184	400	87%	244	214	458	100%
3	13	25	38	25%	65	60	125	83%	81	69	150	100%
4	4	5	9	25%	13	18	31	86%	21	15	36	100%
5	2	1	3	18%	4	7	11	65%	12	5	17	100%
6	—	—	—	0%	1	2	3	25%	6	6	12	100%
7	—	—	—	0%	—	—	—	0%	2	—	2	100%
8	—	—	—	0%	—	—	—	0%	2	—	2	100%
9	—	—	—	0%	—	—	—	0%	—	1	1	100%

When all adjective clauses and noun clauses are excluded from the complexity count, the total number of counts for all students correlates highly (.731) with their clause length scores.

These complexity counts are not satisfactory in their present form, because the counts they give to nominalized clauses seem sometimes to be arbitrary, as was indicated earlier, even though the count is objective. For all that, the kind of information given in Table 42 does have value, for it shows something that the totals and averages for the various modifiers and near-clauses do not show. It shows the limits to how many of these factors can be combined by the various grades all at one time. Rarely (less than 20 times in 18,000 words) do fourth graders get more than 3 counts, eighth graders more than 4, or twelfth graders more than 5. Maturity is related to the number of these structures that can be combined all at once.

Of the three "nominal complexity" counts, the number of nominals given the count of 3 or more is the best indicator of the grade level of the writer.

7-23. Samples of "Highly Complicated" Nominals

As samples of highly complicated nominals, the following are presented from the writings of one twelfth grade boy (12-5).

> Macbeth breaks up the feast with his remarks and *his display of fear of a ghost of Banquo visible only to him.*
> Supplies were stored and the ship outfitted for *a three year voyage in search of the great white whale, Moby Dick.*
> Similarly related to this argument is *the example of what harm could be done to fellowmen by someone advertising false claims about harmful medicines or other goods with a harmful effect on the recipient of them.*

The first sentence was analyzed as containing (1) a subjective genitive *his remarks* related to *he remarked something*; (2) another subjective genitive *his display,* related to *he displayed something*; (3) an objective phrasal genitive *display of fear* related to *someone displayed fear*; (4) another phrasal genitive *fear of a ghost,* perhaps another nominalization of a verb-object as from *someone feared a ghost*; (5) a possessive genitive, *ghost of Banquo,* perhaps related to *Banquo had a ghost*; (6) an adjective with a prepositional phrase complement *ghost of Banquo visible only to him,* related to *the ghost of Banquo was visible to him only.*

The third sentence contains a long and involved nominal. It contains a noun clause in the passive, and the "agent" of the passive clause is a long gerund (or perhaps instead a long participle). This sentence was given a count of 9 as indicated below: "the example (1) of what harm could be done to fellowmen by someone (2) advertising (3) false claims (4) about (5) harmful medicines or other goods (6) with a (7) harmful effect (8) on the recipient (9) of them."

(1) is a prepositional phrase with *of*; the object is all the rest of the passage, a noun clause in the passive related to the active "advertising . . . could *do* harm *to fellowmen*," probably related in turn to "advertising . . . could harm *fellowmen*;" (2) here *advertising* is considered a gerund (though reading it as a participial modifier of *someone* is also plausible); in any event everything after *advertising* is the direct object (with many modifiers) of the verb; (3) an adjective modifying *claims*; (4) a prepositional phrase modifying *claims*; (5) the object of the preposition is modified by an adjective; (6) a prepositional phrase; (7) the object of the phrase is modified by an adjective; (8) *effect* is modified by a prepositional phrase; (9) *recipient* is modified by a prepositional phrase.[2]

An "average" twelfth grade boy has produced a single nominal that is 31 words long. It is only the subject of a clause, yet it is four times as long as the average whole T-unit written by fourth graders. The twelfth grader has had the stylistic good sense not to put this subject at the beginning of the sentence.

This long nominal is an accomplishment no fourth grader was capable of. It is the kind of structure which perhaps would not have been produced if the twelfth graders had been restricted to the simple narratives most congenial to the fourth graders—but that conjecture has no experimental evidence to back it up.

In any event this nominal is long in words because it contains many modifiers and nominalizations. It illustrates the condensation and density which does not appear in the writing of younger average children.

7-24. The Depth of Modification

Modifiers that are not clauses can contain modifiers that are not clauses, just as subordinate clauses can contain other subordinate clauses. For instance, the object of one prepositional phrase can be modified by another prepositional phrase and the object of that can be modified by another and so on. And of course the kinds of modifiers need not all be the same. Depth of subordination or modification need not be measured by depth of self-embedding alone. Clauses and many kinds of nonclauses can be mixed inside each other.

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[2] "The other goods *with* a harmful effect on the recipient of them" is related to "the other goods *have* a harmful effect on the recipient of them" which is related to "the other goods *affect* harmfully the recipient of the goods." "Recipient of the goods" is related to "someone receives the goods."

On a basis of chance alone we would expect that the depth of modification in "complicated" nominals would be greater, on the average, than the depth of nesting in other nominals. This would be true unless some separate factor inhibits this tendency. It would be interesting to see whether depth of modification is an independent index of maturity, or whether instead it is an automatic and predictable corollary of the fact that "complexity" itself is an index, and a more comprehensive index, of maturity.

The depth of "modification" in the two nominals analyzed is considerable, though the two were not selected to illustrate that characteristic.

7-25. Summary of Findings on Nominals

The present chapter has studied nominals, mainly in order to see whether their length increases sufficiently to make that factor important in the lengthening of clauses. It has become clear that nominals tend to be lengthened by older writers and are probably lengthened enough to explain most of the increase in clause length.

A summary of findings on nonclause modifiers and on adjective clause modifiers appears in section 7-12.

A summary of findings on nominalized verbs and clauses appears in section 7-18.

In this last section an attempt was made to objectify and verify the impression that older students write far more complicated nominals than younger students do. Length just in words was not wanted since an extremely long noun clause, perhaps a long quotation, should not be counted as more complex than a single noun with a wide variety of adjective, phrasal, and clausal modifiers.

Though the analysis operated only on what transformational grammar calls "surface structure," it was affected strongly by the "deep structure," as a glance at the more complicated nominals would indicate. It thus provided some support for the impression that older students are able to employ a larger number of what have been called sentence-combining transformations in the production of their nominals, and that their T-units are characteristically farther removed from what have been called kernel sentences. In other words, the complicated nominals are produced by the reduction and consolidation of more and more clauses.

The complexity count showed a high contingency coefficient and correlated highly with clause length.

CHAPTER 8. FINDINGS: THE AUXILIARY OF THE VERB PHRASE

Though a clause must have at least one verb in its predicate, it may also have a variety of what are often called auxiliary verbs in addition to the main verb. The frequency of 20 selected auxiliary items was tabulated in each finite verb phrase for each student, each grade, and each sex within grade. Several of the items were too infrequent to be tested appropriately by an analysis of variance. Nonetheless certain conclusions can be drawn.

8-1. Expansion of the Verb Auxiliary

In general, the verb auxiliary becomes a little more complicated with successively older grades. At least there is an increase in the frequency of modal auxiliaries, "perfect tenses" with *have*, and in passives (Table 43). These changes are all statistically significant for grade at the .01 level.

The progressive forms maintain a constant frequency in fourth and eighth grades and then drop sharply in the twelfth grade.

Do as an auxiliary maintains a constant frequency. It is used primarily to form the negative (doesn't, don't). If questions had been common, as they are in speech, then *do* would have been used commonly in forming them.

Eight modals (will, would, shall, should, can, could, may, might) are used 194 times by fourth graders, 239 times by eighth graders, and 407 times by twelfth graders. By percents the increase is from 48 percent to 58 percent to 100 percent. Thus the increase is substantial from fourth grade to eighth, but still more pronounced from eighth to twelfth. It indicates, perhaps, an increased shading or modulating of the meaning expressed by the main verb. For 5 of these modals individually there is an increase in frequency at each grade level.

The frequency of the perfect forms (*have* followed by a past participle) increases substantially, especially from fourth to eighth grades. The number of occurrences is 50, 125, 144; the percent of increase is from 35 percent to 87 percent to 100 percent.

The passive form (BE followed by a past participle) increases also between the grades: from 50 to 142 to 185. In percents the increase is from 27 percent to 79 percent to 100 percent.

Table 43 — Certain Verb Auxiliary Forms

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
will Verb	11	22	33	11	31	42	21	32	53
would V	33	42	75	42	49	91	64	60	124
shall V	—	—	—	—	—	—	4	1	5
should V	3	1	4	5	2	7	18	28	46
may V	2	—	2	1	3	4	11	13	24
might V	3	1	4	2	2	4	2	—	2
Total			118			148			254
can V	13	12	25	9	17	26	24	71	95
could V	26	25	51	44	21	65	30	28	58
do V	40	43	83	32	50	82	39	32	71
have to V	15	17	32	16	14	30	17	17	34
had rather V	—	—	—	—	—	—	—	2	2
must V	3	4	7	—	3	3	18	30	48
BE to V	—	—	—	1	5	6	3	5	8
BE going to V	13	15	28	9	3	12	2	—	2
BE supposed to V	—	1	1	—	2	2	2	3	5
(perfect tense)									
have + V past participle	14	36	50	48	77	125	75	69	144
(progressive)									
BE + V-ing	64	53	117	55	62	117	25	30	55
get + V past participle	1	2	3	3	5	8	1	3	4
BE + V past participle (passive)	23	27	50	86	56	142	92	93	185
Total	264	301	565	364	402	766	448	517	965
			59%			79%			100%
(Not auxiliary)									
there expletive	38	36	74	33	40	73	19	22	41

The scores for each student on each item listed above and also on various combinations of items were subjected to an analysis of variance, 2 × 3 factorial. The only items found significant are as follows:

Perfect tense: for grade at the .01 level
Progressive: for grade at the .01 level
Passive: for grade at the .01 level
Total of first 6 modals: at the .01 level
Can for grade at the .05 level
and for interaction of sex and grade at .05 level

Three different forms for the future are of at least minor interest. For instance, *will* is used 25 times as often as *shall*. Only by the oldest grade is *shall* used at all.

The "BE-going-to" future has a curious development. Apparently it is learned early and then falls into disuse. It is used 28 times by fourth graders, less than half as often—12 times—by eighth graders, and only twice by twelfth graders.

Unlike "BE-going-to," the "BE-to" future emerges late. It is not used at all by fourth graders, but appears 6 times with eighth graders and is increased to 8 with twelfth graders.

8-2. Summary of the Verb Auxiliary

1. Though by no means all auxiliary forms were tabulated, those that were tabulated showed an increase from 565, to 766, to 965 occurrences. In percentages that increase is from 59 percent to 79 percent to 100 percent. The increase is somewhat more impressive in view of the fact that fourth graders write about one fourth more finite verb phrases than twelfth graders, and so have comparably more opportunities for expansion of the verb auxiliary. Per finite verb phrase, the number of auxiliary items here tabulated was, for each grade, .20, .32, .43. The frequency doubles. Generally speaking, this tendency suggests an increased modulation of the verb auxiliary.

This expansion of the auxiliary has only a slight effect on the lengthening of clauses, for if each item were to add one word, the increase would still be only .2 of a word per clause from grade 4 to 12.

2. Of the 20 items tabulated, 5 appeared often enough and with sufficiently different frequencies to show a statistically significant difference for grade by an analysis of variance. They were these:

1. The total frequency of these 6 modals increased: *will, would, shall, should, may, might.*
2. The frequency of *can* increased.
3. The perfect forms (*have* followed by a past participle) increased.
4. The progressive forms (*be* followed by a present participle) decreased from eighth to twelfth grade.
5. The passive forms (*be* followed by a past participle) increased.

3. For all students, clause length showed a significant correlation with these parts of the auxiliary: passive .556, six modals .368.

Contingency coefficients, where statistically significant, were as follows: progressive forms .464, passives .480, six modals .482.

CHAPTER 9. FINDINGS: THE KINDS OF MAIN VERBS

9-1. The Classes of Main Verbs

The term "main verb" is here used only to exclude auxiliary uses of verbs, for a few verbs can be used both as full verbs and as auxiliaries even in the same sentence (I *have had* my lunch. He *doesn't do* very well. She *is being* difficult.). The great majority of verbs discussed here were written in their finite forms (with tense markers), but non-finite uses are included here as well.

In all grammars verbs are classed according to what structures follow them. Distinctions between transitive, intransitive, and linking verbs, for instance, are made on this basis. Transformational grammarians have classified verbs in this way too and have extended the classification considerably by noting whether the verb can or cannot participate in certain other transformations.

The classification used here follows, with only 2 or 3 variations, that of Lees' (*The Grammar of English Nominalizations*). All verbs used by all students were tabulated in 24 different classes which are tabulated on the following pages.

9-2. Verbs with Other Verbs as Complements

At the outset the main interest for the investigators lay in discovering whether verbs which take whole transformed sentences as their complements appear with about equal frequency at all grades, or whether they increase in frequency in the older grades. If the frequency is equal, that would suggest that such structures are mastered before a child reaches fourth grade. If they should increase, then that would suggest that they are not fully utilized by fourth graders. Furthermore, the increase would be a factor contributing to the lengthening of clauses.

The evidence of this study—to anticipate one of the conclusions—indicates that complement verbs are fully mastered by the fourth grade. There is no convincing evidence of growth in their use. Sample verbs of the sort in question appear in Table 44 along with the frequency of each type.

There is no convincing evidence that any other verb complements have not been mastered by the average fourth grader. This is one point, then, at which older students do not lengthen their clauses by expansion.

Table 44 — Verbs with Transformed Predicates as Complements

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Intransitive verbs									
We avoided going We refrained from going	1	17	18	10	10	20	6	—	6
We expect to go	35	20	55	23	37	60	33	51	84
We hated for him to go	21	35	56	18	23	41	17	15	32
Total	57	72	129 106%	51	70	121 99%	56	66	122 100%
Transitive verbs									
We caught them going We kept them going	3	6	9	3	6	9	7	1	8
We persuaded them to go	23	35	58	29	39	68	24	34	58
Total	26	41	67 101%	32	45	77 117%	31	35	66 100%

9-3. Transitive Verbs with Noun or Adjective Complements

There appears to be no significant difference between the grades in their use of transitive verbs that take noun or adjective complements, though there is a shift in preference from one sort of complement to the other (Table 45).

These complement sentences are related to two sentences, one a sentence with *be* followed by either a predicate adjective or predicate nominal. Thus "We considered John" and "John is the leader" are related to "We considered John the leader." Similarly "We considered John" and "John is lazy" are related to "We considered John lazy."

9-4. Complements of Place and Motion

Some verbs require after them a complement of place or direction: "He *put* it *on the desk,*" "She *glanced away,*" "Mr. Bryant *resides*

Table 45 — Transitive Verbs with Noun or Adjective Complements

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
We considered John the leader	3	2	5	7	9	16	11	15	26
We considered John lazy	13	22	35	7	10	17	9	—	9
Total	16	24	40 114%	14	19	33 94%	20	15	35 100%

in Chicago." This linguistic fact might be stated semantically by saying "One must *put* something some place; one must *glance* in some direction; one must *reside* at some place."

Younger students used all three kinds of verb, especially those with complements of motion, more often than did older students. Perhaps that was because they wrote more often about people being places and, more especially, going places (Table 46).

9-5. Transitive Two-word Verbs

Many verb-particle pairs which take objects are best classed as two-word verbs. Some like *look for, look into, look at* cannot be separated by their objects (We do not say "He *looked* his glasses *for*," "He *looked* the matter *into*," "He *looked* the picture *at*"). These verb-particle combinations are called inseparable.

Other combinations may be separated by a noun object, and indeed must be separated if the object is an unstressed pronoun. (We may say "He looked the answer up." We may also say "He looked it up," and may not say—meaning the same thing—"He looked up it.") These are called separable combinations.

Inseparable two-word verbs increased in frequency: 84, 97, 113. On the other hand separable two-word verbs decreased in frequency: 100, 59, 57. Perhaps one set is conversational and becomes replaced by more learned equivalents later on. Of course it is also possible that the difference is due to chance or to factors such as subject matter.

The increase in one roughly offsets the decrease in the other (Table 47).

Table 46 — Verbs with Complements of Motion or Place

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Intransitive verbs with *complements of motion*									
He went to the store	271	222	493 428%	155	148	303 263%	57	58	115 100%
Intransitive verbs with *complements of place*									
They live in town	50	45	95	24	35	59	14	22	36
Transitive verbs with *complements of place*									
He put it on the desk	29	38	67	18	27	45	22	22	44
Total	350	305	655 335%	197	210	407 210%	93	102	195 100%

The scores for each student on each type of verb and on the totals of the first two types were subjected to an analysis of variance, 2 × 3 factorial.
The first type is significant for grade at the .01 level.
The total of the first two types is significant for grade at the .01 level.

Table 47 — Two-word Transitive Verbs

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Inseparable two-word *transitive verbs*									
He looked for his glasses	51	33	84	57	40	97	62	51	113
Separable two-word *transitive verbs*									
He looked the answers up	50	50	100	38	21	59	36	21	57
Total	101	83	184 108%	95	61	156 92%	98	72	170 100%

9-6. Indirect Object Verbs

Indirect object verbs are used most frequently by fourth graders, then less frequently by eighth graders, and then more frequently by twelfth graders. No significance is apparent in this change (Table 48).

Table 48 — Indirect Object Verbs

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
We gave her a present (to her)	48	53	101	15	31	46	32	27	59
We bought her a present (for her)	3	2	5	—	1	1	5	1	6
Total	51	55	106 163%	15	32	47 72%	37	28	65 100%

9-7. Verbs of Saying, Thinking, Etc.

Verbs followed by direct discourse, or by other noun clauses, appeared without significant difference in frequency from grade to grade, though direct discourse was favored by fourth graders, and other noun clauses were favored by twelfth graders. This has been discussed in the section on subordinate clauses.

9-8. Verb Phrases Like Go *Fishing*

Fourth graders and eighth graders use constructions like *go fishing, go hunting,* more often than twelfth graders do. Perhaps these expressions indicate only that the younger children wrote more often about people's physical activities. The frequency of this verb form was 29, 30, 11.

9-9. Verb Phrases Like *Have a Tooth Pulled*

This construction may be used to indicate that someone else performs an action for whoever is subject of the verb. Perhaps it is derived from something like "He had _____" and the passive "His tooth was pulled by the dentist." Apparently it is related to the active "He had the dentist pull his tooth."

This construction was used infrequently, but more often by twelfth graders: it occurred 4, 1, and 15 times.

9-10. Simple Transitives, Intransitives, and Pseudo-transitives

Simple intransitive verbs decrease markedly from the two early grades to the twelfth grade. No reason for this is apparent (Table 49).

Simple transitive verbs, on the other hand, increase from the first two grades to the twelfth. Again no reason for this is apparent.

There is another group of verbs called mid-verbs, or pseudo-transitives, or defective transitives, which are followed by nouns like transitives, but which cannot form passives or take manner adverbs as can transitives.

Have is the commonest pseudo-transitive, and many verbs of measure fall into this group too. They became slightly less frequent from grade to grade.

Table 49—Simple Transitives, Intransitives, and Pseudo-transitives

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Simple intransitives They came quickly	155	181	336	140	200	340	98	83	181
			186%			188%			100%
Simple transitives He opened the window quickly	468	395	863	438	407	845	456	508	964
Pseudo-transitives It cost three dollars	65	68	133	57	69	126	58	50	108
Total	688	644	1332 106%	635	676	1311 105%	612	641	1253 100%

The scores for each student on each type of verb were subjected to an analysis of variance, 2 × 3 factorial. The scores on simple intransitives were significant for grade at the .01 level.

9-11. Linking or Copula Verbs

The various types of linking verbs, not counting forms of BE, appear also without significantly different frequency between grades (Table 50).

9-12. The Verb BE

The verb BE, as a full verb (not as an auxiliary in the progressive

Table 50 — BE and Other Linking Verbs

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Linking verbs									
We felt confident	2	1	3	—	2	2	—	1	1
We seemed confident	5	1	6	9	8	17	7	3	10
We became leaders	12	20	32	10	20	30	25	22	47
We became confident									
Total	19	22	41	19	30	49	32	26	58
			71%			84%			100%
BE	255	285	540	269	278	547	303	383	686
			79%			80%			100%

The scores of each student on all types of verbs were subjected to analysis of variance, 2 × 3 factorial. *BE* was found significant for grade at the .01 level.

tense or in the passive) was used with special frequency by twelfth graders.

Predicate adjectives appeared 167, 161, 225 times. Predicate nominals appeared 244, 290, 315 times. Totals of the two are 411, 451, 540. BE also would appear in the expletive "there" sentences, before certain expressions of time and place, etc.

BE appeared ten times as often as the other "linking verbs."

9-13. Summary of Findings on Main Verbs

1. Verbs were classified into 24 types according to both the structures which characteristically follow them and also the other structures they can appear in. The frequency of each type and of various combinations of types was analyzed for statistical significance by an analysis of variance. Only the following 3 types showed significant differences. Some types were not used commonly enough to be tested by this method.

a) Simple intransitives (*They came quickly*) decreased from grade 8 to 12 and showed a significance for grade at the .01 level. They correlated significantly and negatively with T-unit length (−.445) but not with clause length. They had a contingency coefficient of .415.

b) Intransitives with complements of motion (*He went to the store*) decreased from grade to grade with a significance at the .01 level. They correlated significantly and negatively with clause length (−.608) and T-unit length (−.728). They had a contingency coefficient of .482

c) The use of BE as a main verb (separate from the progressive or passive forms) increased from grade 8 to 12 and showed a significance for grade at the .01 level.

It had a contingency coefficient of .476 but did not correlate significantly with either T-unit length or clause length.

2. The fact that simple intransitives and BE appear with significantly different frequency from grade to grade has no obvious explanation.

3. There seems no doubt that the average fourth grader can produce freely all types of verbs together with the predicate elements they require. In fact, it seems doubtful that the classification of sentences by types of predicate is a fruitful area of investigation for children as old as fourth graders—unless a larger sample might turn up something not found significant in this study. The possible significance of place and motion complements will be mentioned again in the next chapter.

4. The number of finite verb forms (forms with tense markers) was, for each grade, 2,897, 2,387, 2,235. Some of these were coordinated together, so the number exceeds the number of clauses.

The total numbers of verb forms, both finite and nonfinite, were 3,388, 2,963, 2,959. Some were imperatives, some were modifiers of nouns, some were in complex phrases (expected *to go*), some were nominalized into "near-clauses." The number per clause was 1.24, 1.32, 1.39, an increase of only .1 or .2 of a word per clause. It seems clear that no expansion of the main verb has an appreciable effect on the lengthening of clauses over the years.

CHAPTER 10. FINDINGS: NONCLAUSAL ADVERBIALS

One of the ways in which a clause could be lengthened would be by adding more nonclausal adverbials. They are either single words like *hastily, inside, Tuesday* or prepositional phrases like *with haste, in the house, on Tuesday.* Those will be the subject of this chapter.

So-called adverbial clauses have already been discussed but will be mentioned again here. Certain nonclausal adverbials have already been tabulated in the previous chapter as complements to verbs of a certain sort, and they too will be mentioned again here.

10-1. The Decline in Adverbials of Time and Place and Motion

In discussing the words that introduce movable adverbial clauses we noticed that *when*-clauses—no doubt signifying time—declined in frequency from 101 to 73 to 51. They dropped to half the original frequency. We observe now that nonclause adverbials of time also decline, and again the decline is to half the original frequency, but this decline occurs only in the second half of the time span: 525, 631, 275 (Table 51).

The decline is significant for grade only and at the .01 level.

In the previous chapter (Table 46) we noticed that complements of place and motion also declined in frequency. We observe now that nonclause noncomplement adverbials of place and motion also decline, from 271 to 216 to 166. The total of such complements and noncomplements of place and motion is 926, 623, 361 (258 percent, 173 percent, 100 percent).

This overall reduction in adverbials of time and place and motion is perhaps due in part to a shift away from narratives about people doing things in time and at places.

The total of all such nonclause adverbials of time, place and motion both complements and noncomplements is thus 1,451, 1,254, 636. In percentages the decline is from 228 percent to 197 percent to 100 percent. These changes from grade to grade, and the values for boys and girls, are summarized in Table 51.

10-2. The Increase in Adverbials of Manner, Etc.

Adverbials of manner increase with maturity, from 200 to 290 to 352. They almost double. The increase is observable both in the single-word and the prepositional phrase varieties, as Table 52 indicates. This increase is significant for grade only, and at the .01 level.

Table 51 — Nonclause Adverbials of Time, Place, and Motion Used as Complements and as Modifiers of Verbs

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Noncomplements									
Nonclause adverbials of time	249	276	525	332	299	631	144	131	275
Noncomplement adverbials of motion	73	62	135	48	56	104	23	33	56
Noncomplement adverbials of place	60	76	136	65	47	112	61	49	110
Total motion and place only			271			216			166
Total time, motion and place			796 181%			847 192%			441 100%
Complements plus noncomplements (Complements are from Table 46)									
Noncomp. plus comp. of motion	344	284	628	203	204	407	80	91	171
Noncomp. plus comp. of place	139	159	298	107	109	216	97	93	190
Total comp. and noncomp. of place and motion			926 258%			623 173%			361 100%
Total comp. and noncomp. of time, place and motion			1451 228%			1254 197%			636 100%

For each student several different scores mentioned above were subjected to analysis of variance, 2 × 3 factorial. The significance is as follows:

Noncomp. of motion:	for grade at .01 level
Noncomp. of time:	for grade at .01 level

Table 52 — Adverbials of Manner, Etc.

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Adverbials of manner									
Single words	36	57	93	62	82	144	66	67	133
Prepositional phrases	39	49	88	57	76	133	88	110	198
Subtotal			181			277			331
			55%			84%			100%
Other adverbials, not time, place, motion or manner	17	45	62	32	37	69	86	68	154
			40%			45%			100%
Total of manner & other			243			346			485
			50%			71%			100%
Noncomplement time, motion, place adverbials (from previous table)			796			847			441
			181%			192%			100%
Grand total of noncomplement adverbials of all types			1039			1193			926
			112%			128%			100%
Verb complements of place and motion (from previous chapter)			655			407			195
Grand total of complement and noncomplement adverbials of all types			1694			1600			1121
			151%			143%			100%
No. per clause			.63			.72			.54

The significance of manner adverbials, and of all noncomplement adverbials, by an analysis of variance, 2 × 3 factorial, is for grade at .01 level.

Adverbial modifiers of types other than those mentioned thus far also increase: 62, 69, 154, but they make up a small fraction of the total.

10-3. The Total of Noncomplement Adverbials plus Complements

If we total the noncomplement adverbials of time, place, and motion, which decrease markedly from grades 8 to 12, and the adverbials of manner, which instead increase markedly in both periods of our time span, we get an increase and then a larger decrease over our time span. The totals are 1,039, 1,193, 926.

But if we then add the adverbial complements from the previous chapter, we get a large and decisive decline in the total of nonclausal adverbials from grades 8 to 12, a decline of nearly 500: 1,694, 1,600, 1,121.

10-4. A Factor Which Would Shorten Clauses

In recent chapters we have examined various parts of the clause and have invariably found evidence, either slight or substantial, that older students lengthen their clauses in the way being examined.

Here, however, we are confronted by the opposite. In total number of nonclause adverbials, both complements to verbs and noncomplements, there is a substantial decrease, especially from grade 8 to 12. The decrease is about 500. Per clause the number for each grade is .63, .72, .54. Twelfth graders use almost .2 fewer per clause. It is difficult to estimate this loss in words, but the number of phrases equals or exceeds the number of single words of the same category, so the loss is fairly substantial in view of the fact that twelfth grade clauses are only half a word longer than eighth grade clauses. This loss must be more than compensated for by gains in other places.

10-5. Attributive Adverbs

Attributive adverbs such as *very, extremely, really* were used preceding adjectives by all grades. They increased in frequency from fourth to eighth grades (106, 178, 163).

Attributive adverbs were also used before adverbs by all grades (28, 22, 31 times).

10-6. Sentence Adverbials

In addition to adverbials that relate to the verb within their own clause, there are adverbials which relate one T-unit to the preceding T-unit. Examples are *generally, perhaps, of course, maybe, after all, also, especially, ultimately, above all, most important, finally, obviously, in turn.*

These increase considerably from fourth to eighth grades, but not significantly from eighth to twelfth (74, 130, 132).

10-7. Preverbs

The adverbs here called preverbs are those affirmatives or negatives which ordinarily precede the main verb. The commonest examples are *not, n't, never, only, always, just.* Fourth graders used them often, 172 times, in fact more than eighth graders did (163 times), but less often than twelfth graders did (209 times).

10-8. Summary of Findings on Nonclause Adverbials

In the following summary, adverbials modifying nouns are excluded, since they were discussed in Chapter 7 (*the party last night, the tree in my yard*).

1. The tendency observed earlier for time adverbial clauses to decline in the older grades has its parallel here in a tendency for nonclause adverbials of time to decline. The decline is significant for grade at the .01 level.

2. The tendency observed earlier for verb complements of place and motion to decline in the older grades has its parallel here in a tendency for noncomplement adverbials of place and motion also to decline, especially from grades 8 to 12. The decline is significant for grade at the .01 level.

3. Adverbials of manner about double in frequency and the increase is about equal in the earlier and later periods. The increase is significant for grade at the .01 level.

4. If the total of verb-complements of place and motion from the previous chapter are added to all the adverbials in this chapter, the total indicates a decisive decline of almost 500 in the number of nonclause adverbials: 1,694, 1,600, 1,121. Per clause the number is .63, .72, .54.

5. Though on the whole the mean clause length increases from grade to grade, that increase does not occur through any expansion in adverbial modifiers or adverbial complements of the verb.

For all students, the number of expressions of place and motion used as modifiers and complements of verbs correlated significantly and negatively with clause length (−.584) and T-unit length (−.725). Manner adverbials correlated significantly with clause length (.516) and with T-unit length (.606).

6. A summary on the other special classes of adverbs is as follows:

a) Attributive adverbs were used before adjectives 106, 178, 163 times.

b) Attributive adverbs were used before adverbs 28, 22, 31 times.

c) Sentence adverbials were used 74, 130, 132 times.

d) Preverbs were used 172, 163, 209 times.

CHAPTER 11: FINDINGS: PREDICATE ADJECTIVES AND ADJECTIVE COMPLEMENTS

11-1. Simple Predicate Adjectives and Adjective Complements

Adjectives following forms of BE and certain other linking verbs are called predicate adjectives: "Jimmie is *fast*." Such sentences can be combined with certain other hypothetical sentences such as "We considered Jimmie ________" to produce the adjective complement sentence "We considered Jimmie to be *fast*" or "We considered Jimmie *fast*."

The two younger grades used simple predicate adjectives with about equal frequency, but twelfth graders used them distinctly more often: 167, 161, 225 (Table 53). Simple adjective complements were not used commonly by any grade, but they were used distinctly more often by twelfth graders: 3, 10, 22. The total for simple predicate adjectives and predicate complements was 170, 171, 247; the percentages were 69 percent, 69 percent, 100 percent (Table 53).

In addition to simple predicate adjectives and adjective complements, each grade used complex adjectives with their own complements as will be shown in the next section.

11-2. "Complex" Adjectives with Their Own Complements

Adjectives in predicate position and complement position can take a variety of their own complement structures, including clauses, infinitives, and prepositional phrases. With such complements, the adjectives are called "complex."

The adjective and its clause complement are underlined in this sentence: "He is *glad (that) you can go*." This construction was mentioned in the section on subordinate clauses. Such clause complements were used more frequently by twelfth graders than by the younger students: 7, 7, 13.

The infinitive complements are of three sorts. "He is *glad to go*" related to "He is glad" and "He will go." The second sort, "He is *smart to go*" is similar, but it is related to "For him to go is smart," whereas the first infinitive cannot be changed into "For him to go is glad." The third sort, "He is *easy to understand*" is related to the infinitival nominal "(For us) to understand him is easy."

Table 53 — Simple Predicate Adjectives and Predicate Complements

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Simple predicate adjectives	74	93	167	80	81	161	85	140	225
Simple predicate complements	1	2	3	3	7	10	8	14	22
Total			170			171			247
			69%			69%			100%

According to analysis of variance, 2 × 3 factorial, the significance of predicate adjectives is both for grades and for sex at the .05 level.

The increase in frequency for these three infinitive complements was very substantial. The totals were 8, 27, 52.

The prepositional phrase complement "glad for him" or "glad about it" increased with older grades: 20, 28, 69.

The totals of all complements to adjectives were 35, 62, 134: in percentages, 26 percent, 46 percent, 100 percent (Table 54).

Table 54 — Complements to Adjectives

	Grade 4			*Grade 8*			*Grade 12*		
	Boys	*Girls*	*All*	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
Clause complement									
glad (that) you can go	4	3	7	2	5	7	2	11	13
Infinitive complement									
glad to go	4	3	7	7	13	20	18	27	45
smart to go	—	—	—	7	—	7	1	2	3
difficult to understand	—	1	1	—	—	—	1	3	4
Subtotal			8			27			52
Prepositional phrase complement									
glad for him	8	12	20	13	15	28	19	50	69
Total all complements			35			62			134
			26%			46%			100%

According to analysis of variance, 2 × 3 factorial, the significance for prepositional phrase complements is for grade, and for sex, and for the interaction of sex and grade all at the .01 level.

CHAPTER 12. SUMMARY AND CONCLUSIONS

12-1. A Summary of the Summaries

The present study began with an examination of what was called "the standard view"—a set of opinions concerning clause length, the frequency of subordinate clauses, and sentence length as indexes of maturity. The concept of the "minimal terminable unit," which includes one main clause plus all the subordinate clauses attached to or embedded within it, was then introduced. Using that concept, it was possible to (1) provide an apparently more valid index of maturity; (2) reappraise the significance of clause length and frequency of subordinate clauses as factors contributing to sentence length; and (3) explain (a) why sentence length is as good an index of maturity as it is, and (b) why it is no better than it is: why it is not so good an index as T-unit length.

An examination of the writing of superior adults revealed that they differ from average twelfth graders primarily in the length of their clauses. This factor alone accounts for about three fourths of their superiority over the others in sentence length and T-unit length. Very rarely do they write "short" T-units.

The first part of the study ended with the clear indication that T-unit length is somehow tied closely to maturity. The second part of the study was devoted mainly to the question of what structures go into those T-units as they are written by average students in the three grades.

It is convenient to think of a T-unit as one main clause expanded at any of many different points by structures that are modifiers or complements or substitutes for words in the main clause. The ensuing chapters tried to discover just which parts of the main clause are expanded, amplified, by the three grades, and which structures are used for that expansion.

Short main clauses can be expanded by incorporating into them either subordinate clauses or nonclauses. The investigation of subordinate clauses showed that adjective clauses, rather than noun clauses or movable adverb clauses, are the ones used more often by older students. In equal numbers of words, eighth graders used one and a half times as many adjective clauses as fourth graders, and twelfth graders used more than twice as many as fourth graders. Per T-unit, eighth graders used twice as many as fourth graders, and twelfth graders used more than three and a half times as many as fourth graders. But superior adults used virtually the same number of subordinate clauses per T-unit as twelfth graders (though the proportion of adjective clauses was still larger). So the amount of T-unit expansion that can occur through the addition of subordinate clauses seems to have fairly definite practical limits, and those limits seem to be reached already by the average twelfth grader. If further expansion of the T-unit is to occur--and already we have seen that it does occur—that expansion must be achieved in the other way: by increasing the number of nonclause optional elements that are added to the minimal essentials of the clause such as subject and finite verb, etc.

The remaining chapters were addressed to nonclauses. Though the clauses of the twelfth graders average only half a word longer than those of the eighth graders, the fact that the clauses of superior adults average about three and a half words longer suggests that clause length is especially worth studying as a place where substantial growth can occur. First, nominal structures were examined, then verb structures (the auxiliary and then main verb), then nonclause adverbial structures not modifying nouns, and, last, predicate adjectives. From that study three facts stand out.

1) At several places there are increases which, though significant, are insufficient to affect clause length appreciably, as, for instance, with predicate adjectives.

2) The total number of nonclause adverbials related to verbs as complements or modifiers decreases over all from grades four to twelve. But there is an increase of about one tenth of an adverbial per clause from grades four to eight and then a decrease of nearly two tenths per clause from grades eight to twelve. About half these adverbials were prepositional phrases several words long. The effect of this decrease in words per clause from grades eight to twelve was more than offset by gains in length elsewhere.

3) The major lengthening of the clause occurs as an expansion of the nominals used as subjects, objects of verbs, objects of preposi-

tions, etc. For instance, eighth graders, as compared with fourth graders, use about a third more modifiers of nouns per clause, and twelfth graders, as compared with fourth graders, use more than twice as many per clause.

The same adjectives, prepositional phrases and verbal forms that appear as modifiers of a noun can also appear as predicate elements, usually after a form of BE, with the same noun as subject. (The man is tall, the tall man; the book is on the table, the book on the table; the car is painted red, the car painted red; the tide is rising, the rising tide.) One gets the impression from studying these materials that the younger students tend to use short clauses to express these meanings, whereas older students tend to reduce such clauses to mere modifiers which are consolidated with the same noun in another clause, thus achieving greater length.

Many of the genitive modifiers result from the nominalizing of clauses. (Someone nominalizes clauses; someone*'s* nominalizing *of* clauses. Two genitives.) To convert a clause to a nonclause nominal is a characteristic of older writers, as the increase of infinitival nominals and gerunds testifies. Eighth graders write twice as many of these per clause as fourth graders, and twelfth graders write two and a half times as many per clause as fourth graders do.

So the chief factor which lengthens clauses appears to be the increasing of nonclause modifiers of nouns and the nominalization of clauses. This factor and the increase in adjective clauses account in the main for the increased length of T-units.

According to this sample, the student of average IQ, when he gets his high school diploma, writes T-units about 160 percent as long as those he wrote eight years earlier. If ever he learns to write like a "superior adult" his T-units will be some 230 percent of what they were in fourth grade.

The older student can incorporate and consolidate more grammatical structures into a single grammatically interrelated unit. The younger student produces short separate units. His span of grammatical concern or attention is narrow. As he matures that span broadens, so he casts the net of consolidation over larger and larger bodies of material. As he consolidates, he also discards needless words. His redundancy lessens and his succinctness gains. Unless we suppose that there is less thought per word in the writing of older students, then we must suppose that as students mature they learn to incorporate a larger and larger body of thought into a single intricately related organization.

12-2. A Recapitulation on Consolidation of T-units

As this study draws to its close, it might be useful to look at three different versions of the same passage, each version more mature in the terms of this study.

Suppose that a student wants to say these several things.

> The sailor finally came on deck. He was tall. He was rather ugly. He had a limp. He had offered them the prize.

Written thus we have five T-units, with an average length of 5.4 words, shorter than the fourth grade average of 6.6 words.

These five T-units might all have been strung together with too many *and's*, but none of the fourth graders in this study produced anything quite that anomalous. But a fourth grader might have reduced two of them to nonclausal structures coordinated with *and*.

> The sailor finally came on deck. He was tall ***and rather ugly and had a limp***. He had offered them the prize.

As a result, the average clause length has been increased from 5.4 words to 7.3 words, something between the fourth and eighth grade averages. One clause is now 12 words long, longer than the average clause of superior adults. The average T-unit length has been increased too. It is 7.3 words, still below the fourth grade average; but now one of the three T-units is "middle-length," whereas originally all five would have been counted with the "shorts."

Of course any one of the original five T-units could have become an adjectival clause, but four can hardly be attached to a single noun. The limit on nonclausal modifiers, if there is one, is much higher.

Actually these five T-units can be all consolidated into a single T-unit. Three units will be reduced to nonclausal structures: one to an adjective, one to an adjective with an adverbial modifier, one to a prepositional phrase. A fourth is here reduced to a subordinate clause, an adjectival.

> The *tall, rather ugly* sailor *with a limp, who had offered them the prize,* finally came on deck.

This T-unit is now 18 words long, longer than the 14.4 word average for twelfth graders. The number of clauses is 2, whereas the average for twelfth grade T-units is only 1.67. The two clauses average 9 words in length, whereas the twelfth grade average is 8.6. Five "short" T-units have been consolidated into a "middle-length" one. The nominal has been "complicated" four times, and fourth graders in this study produced only 9 like that in 18,000 words. Eighth graders produced 31 of them and twelfth graders 36. All in all, then, this is a moderately mature sentence, clearly more mature than the average sentence produced by the average twelfth grader; but by no means impossible for him, nor impossible for the average eighth grader either.

It seem natural enough to suppose that the fourth graders and the twelfth graders all get their ideas expressed, but apparently the younger writers spread their ideas out more thinly over more clauses and more T-units.

The three alternate versions show one thing more: the increased succinctness and economy which comes with the reducing of clauses (or sentences or T-units) to nonclausal structures. The first version, even without *and's* to join the five sentences together, took 23 words. The second version, though it adds two *and's*, took only 22 words. The third version took only 18 words. The length is thus reduced by one fourth. The consolidation of T-units saves words. Older students say more in a thousand words.

12-3. A Summary List of Statistically Significant Indexes

In the course of this study, 36 variables have been reported as statistically significant for grade level at the .05 or .01 level. Those are listed in Table 55 together with the percentage increase or decrease from grade to grade.

On all but 1 of the 36 the significance for grade was equal to or greater than the significance for sex or for the interaction of sex and grade. In fact, on only 14 of the 36 was there any sigfinificance at all for sex or the interaction of sex and grade. These significances are also listed in Table 55.

Table 55 — A Summary List of Variables Significant by Analysis of Variance

Name of Variable	Significance by analysis of variance, 2 x 3 factorial: For grade	For sex	For interaction of S x G	Relative frequency in %, taking grade 12 performance as 100%: Grade 4	Grade 8	Table reference
Clause to sentence length factors						
1. Mean sentence length	.05	.05		79	94	2
2. Use of *and* between T-units	.01	.05		470	175	3
3. Mean clause length	.01	.01		77	94	4
4. Ratio of subordinate to all clauses	.01		.05	55	72	5
5. Mean length of T-units	.01			60	80	6
6. T-units shorter than 9 words	.01			445	209	9
7. Ratio of clauses per T-unit	.01		.05	77	85	12
8. Ratio of T-units per sentence	.01		.05	137	117	14
Subordinate clauses						
9. Noun clauses	.05	.05		79	67	26
10. Adjective clauses	.01			46	68	27
Expansion of nominals						
11. Total of 3 commonest nominals (unmodified)	.01		.05	157	121	35
12. Adjectives as noun modifiers	.01			60	98	39
13. Genitives as noun modifiers	.01			78	81	36
14. Prepositional phrases as noun modifiers	.01			42	72	37
Nominalized verbs						
15. Infinitives as noun modifiers	.01		.01	24	51	37
16. Past participles as noun modifiers	.05	.01		81	80	37
17. Present participles as noun modifiers	.01		.01	47	120	37
18. Factive infinitivals	.01			61	70	41
19. Gerunds	.01			10	40	41

Table 55 – Continued

	Complexity count for nominals					
20. Counts for "complexity" of nominals	.01					42
21. Counts given to nominals with counts of 2 or more	.01					42
22. Counts given to nominals with counts of 3 or more	.01					42
	Verb auxiliary					
23. "Perfect" forms (have + past participle)	.01			35	87	43
24. "Progressive" forms (be + present participle)	.01			262	262	43
25. Passives	.01			27	77	43
26. Total of 6 modals	.01			46	58	43
27. Occurrences of *can*	.05		.05	50	59	43
	Main verbs					
28. Intransitive verbs with complements of motion	.01			428	263	46
29. Intransitive verbs	.01			186	188	49
30. Use of BE as main verb	.01	.05		79	80	50
	Nonclause adverbials related to verbs					
31. Noncomplement adverbials of motion	.01			367	237	51
32. Noncomplement adverbials of time	.01			298	216	51
33. All nonclause noncomplement adverbials	.01			112	128	52
34. Adverbials of manner	.01			55	84	52
	Predicate adjectives					
35. Predicate adjectives	.05			74	71	53
36. Prepositional phrase complements to adjectives	.01	.01	.01	29	41	54

Table 56 – Variables Ranked by Order of Certain Correlations and by Contingency Coefficients

Rank order by correlation with clause length

Name of variable	*Correlation*	*Name of variable*	*Correlation*
Total of 3 commonest nominals (Unmodified)	−.839	Gerunds	.567
Mean length of T-units	.836	Passives	.566
T-units shorter than 9 words	−.781	Adjectives as noun modifiers	.547
Counts given to nominals with counts of 2 or more	.780	Adverbials of manner	.516
Personal pronouns incl. *it*	−.769	Ratio of clauses per T-unit	.436
Counts for "complexity" of nominals	.730	Infinitives as noun modifiers	.431
Counts given to nominals with counts of 3 or more	.687	Mean sentence length	.429
Intransitive verbs with complements of motion	−.608	Genitives as noun modifiers	.396
Noncomplement adverbials of motion	−.584	Unmodified common nouns	−.384
Prepositional phrases as noun modifiers	.567	Total of 6 modals	.368
		"Progressive" forms (be + present participle)	−.351
		Ratio of T-units per sentence	−.301
		Intransitive verbs	−.283
		Present participles as noun modifiers	.278

Rank order by correlation with T-unit length

Name of variable	*Correlation*	*Name of variable*	*Correlation*
T-units shorter than 9 words	−.902	Adjective cla[illegible]es	.615
Mean clause length	.836	Adverbials of manner	.606
Ratio of clauses per T-unit	.831	Prepositional phrases as noun modifiers	.560
Total of 3 commonest nominals (unmodified)	−.818	Passives	.519
Counts for "complexity" of nominals	.772	Total of 6 modals	.516
Counts given to nominals with counts of 2 or more	.769	"Progressive" forms (be + present participle)	−.461
Intransitive verbs with complements of motion	−.728	Intransitive verbs	−.445
Noncomplement adverbials of motion	−.725	Genitives as noun modifiers	.436
Personal pronouns incl. *it*	−.685	Mean sentence length	.429
Counts given to nominals with counts or 2 or more	.672	Unmodified common nouns	−.403
Gerunds	.660	Ratio of T-units per sentence	−.381
		Factive infinitivals	.368
		Prepositional phrase complements to adjectives	.329
		"Perfect" forms (have + past participle)	.318

Table 56 — Continued

Rank order by contingency coefficients			
Name of variable	*Contingency Coefficient*	*Name of variable*	*Contingency Coefficient*
T-units shorter than 9 words	.70	Passives	.480
Mean length of T-units	.694	Adjectives as noun modifiers	.476
Counts given to nominals with counts of 3 or more	.66	Use of BE as main verb	–.476
Mean clause length	.616	Gerunds	.469
Counts for "complexity" of nominals	.61	"Progressive" forms (be + present participle)	.464
Counts given to nominals with counts of 2 or more	.60	Personal pronouns incl. *it*	.464
Ratio of subordinate to all clauses	.523	Adverbials of manner	.435
Noncomplement adverbials of motion	.523	Intransitive verbs	.415
Genitives as noun modifiers	.520	Prepositional phrase complements to adjectives	.412
Ratio of clauses per T-unit	.496	Factive infinitivals	.391
Noncomplement adverbials of time	.492	Total of 6 modals	.389
Mean sentence length	.489	Adjective clauses	.389
Intransitive verbs with complements of motion	.482	Unmodified common nouns	.389
Prepositional phrases as noun modifiers	.481	Past participles as noun modifiers	.369
		Infinitives as noun modifiers	.368
		Present participles as noun modifiers	.336

CHAPTER 13. IMPLICATIONS FOR FURTHER RESEARCH

13-1. Further Research in the Language of Schoolchildren

The present study is only a pilot study: a relatively intensive investigation of writings from a relatively small population. Its findings need to be checked by other investigators working on other populations. No doubt some findings will be corroborated, some will be corrected, some will be revised and refined. Nonetheless, the instrument and procedure and results provide a basis for further study.

The synopsis of clause-to-sentence factors is an especially attractive tool of analysis, for it is simple and can be applied rather quickly. The analysis of nonclausal structures is, on the other hand, extremely laborious and time-consuming. Nonetheless it seems to provide a depth of understanding which the other tool would not supply.

On certain bodies of writing it might be most efficient to use the faster analysis to cover a large body of writing and the slower analysis for depth of penetration into a smaller subsample.

1. The mode of analysis developed here might also prove useful for speech analysis. Strickland reports that the length of sentences as measured by the number of words between final intonation patterns is not significant for grade level. It would be worth checking clause length and T-unit length to see if they have significance. If they do, new comparisons between speech and writing should be made.

2. Now that a degree of significance has been established on cross sectional materials with a gap of four years between cross sections, far more interesting case histories could emerge from a study of the longitudinal materials which are already being accumulated.

3. Students in this population were all "average" as determined by a single IQ test. Obviously the use of a battery of language achievement tests could provide more homogeneous achievement or ability groups. The characteristics of different ability or achievement groups within the same grade and age level might be analyzed by the methods developed here.

4. The analysis of the writings of "superior adults" is currently being extended to cover their nonclausal structures. A comparable analysis of the writing of "superior" twelfth graders and "superior" fourth graders is also under way.

5. This method of analysis might be applied to books of readings designed for various grade levels.

6. In readability formulae, T-unit length or clause length may prove more significant than sentence length.

7. Experiments might be devised to test whether the differences described in this study still exist when students in different grades all "say the same thing."

8. The growth trends described here for English speakers might be compared with the growth trends of children to whom other languages are native.

13-2. The Influence of Subject Matter

At several points in this study suggestions have been made concerning the effect of subject matter on grammatical structure. For instance, the shift from noun clauses expressing direct discourse to noun clauses expressing indirect discourse is apparently linked to subject matter: the fourth graders wrote stories that told what people said; the twelfth graders wrote about what Pope believed and Huxley believed about the state of mankind. Fourth graders don't ordinarily write on such subjects. That does not mean that the shift in subject matter is not linked to maturity, of course. It indicates instead that the shift in noun clauses is linked to maturity by being linked to subject matter.

In contrast, the increase in adjective clauses is, apparently, not influenced by subject matter. It is due instead to the widening span of grammatical concern and attention. Adults use more adjective clauses in nondialog sentences even when they too are writing stories about what people did and said. Adults writing expository articles use more adjective clauses too.

We need to know whether subject matter, or mode of discourse, or treatment of subject matter tends to change characteristically as a child matures. This study merely assumes as much. We need also to isolate and describe more clearly the effect of subject matter on grammatical structures.

13-3. Further Research in Mature Language

The mode of analysis developed here might serve as the basis for a quantitative analysis of the style of mature writers.

1. The narrative styles of, say, Hemingway and Faulkner or James and Steinbeck are obviously different. Dialog and nondialog should be kept separate.

2. The style used by an eminent fiction writer in his fiction and nonfiction might be compared.

3. The prose styles used in different historical periods might be compared.

4. The style of public discourse that is not first written out and of public discourse that is written out to be read aloud might be compared.

13-4. Further Research into Problems of Sentence Construction

Further research into the problems of sentence construction is certainly possible and might turn out to be illuminating.

As more nonclausal structures are packed into a clause the likelihood of stylistic faults occurring increases apace. The greater the congestion the greater the hazard.

The full range of these hazards has never been explored. Yet the experimenter who starts with a half dozen simple clauses and notes the many consolidations which become possible, and who then tries to work these all into a tidy sentence, will quickly become aware of the hazards. (Just what a "tidy" sentence is could probably be approached in structural terms.)

One hazard in a congested sentence is momentary structural ambiguity. When this fault occurs, the reader gets to a point in the sentence where his first interpretation of the deep or surface structure is no longer plausible: the remainder of the sentence becomes unintelligible. He must pause and perhaps retrace his steps to establish a second revised interpretation, one which will carry him successfully through the remainder of the sentence.

Here are a few examples committed by experts on language (everyone who writes about writing lives in a glass house):

> Indians find hopelessly difficult sounds and sound combinations that are simple to us.

> One could give many examples from any of the current phonics texts of linguistic inaccuracies.
> Some students kept records of never missing intact for months.
> A total of eighty-five year fellowships will be awarded.

"Permanent" structural ambiguities have been studied in some detail in the last two decades, but they seldom if ever occur in actual writing. "Temporary" or "momentary" structural ambiguities are quite common in nonprofessional writing. The writing teacher is continually occupied with them. No doubt the expert writer is concerned with them too, though he may be only half-conscious of the problem. The only aspects of such ambiguity that have received anything like adequate analysis are (1) the reference of pronouns and (2) the placement of modifiers.

Another problem concerns long nominals as subjects (we often shift to the "deferred subject" construction, or invert a subject-BE-predicator word order). Still another concerns long interrupters.

All these problems can be approached as tactical or strategic matters confronting the writer who strives to pack more and more nonclause structures into his clauses, while keeping them light enough to fly airborne into the reader's mind.

13-5. Advances in the Scope of the Analysis

No one has yet written a transformational grammar (or any other kind of grammar) which will describe systematically anywhere near all the sentences in English. Eventually the list of transformations may be extended to include the stylistic variants (for example, *Obvious to us all was the need for further research* from *The need for further research was obvious to us all*). As the list is extended, the insights provided by an analysis such as this will become more fruitful. The advanced writer distinguishes himself by the use of sentence-combining transformations which have entirely escaped the tabulation used in this exploratory study.

A number of structures tabulated in this study were too uncommon to have statistical significance in a sample no larger than this. These structures and other uncommon stylistic variants could be searched for in larger bodies of writing, without any necessity for tabulating the commoner structures.

13-6. A Prediction about Further Analyses

Thirty years ago LaBrant wrote, "This increase in length [of clauses] is apparently occasioned by *the reduction of* clauses to participial and infinitive phrases, and by *the elision* of words, phrases and clauses." That process has now been investigated in some detail.

The present study gives no evidence that the mature writer in his first version writes shorter T-units which he later consolidates into fewer and longer and more compact ones. Perhaps he does the opposite. (It might be possible to illuminate that question by proper study.)

The present study does imply that the mature writer produced shorter T-units when he was in the fourth grade. It implies that he learned to consolidate while he was growing up, not necessarily during the process of revising a single piece. This process of expansion of T-units by the addition of more nonclausal structures appears to be a characteristic which a psychological model for language development will need to incorporate.

If the implications of this study are valid, then we can predict that an "inside" analysis of the clause structures written by the "superior adults" already mentioned will show that they use still more of these same nonclause structures per clause. Such a prediction is not discouraged by a glance at the first sentence in the first article by a "superior" adult. This is the sentence with all its panoply of noun modifiers: "The International Brotherhood of Teamsters, the Nation's biggest, strongest, and most investigated union, is a monument to the sweet uses of adversity, a testimonial to the proposition that nothing succeeds like bad publicity." That is far more heavily compacted than the sample sentence about the sailor who came on deck.

CHAPTER 14. IMPLICATIONS FOR THE CURRICULUM

14-1. Something to Avoid

This study provides no evidence at all on the question of whether the abstract description of sentence structures should have any part in the English curriculum. That question must be debated on grounds quite apart from the findings of this study. During the past two decades "schoolroom grammar" has been vigorously assailed by language specialists as being vague, confusing, and self-contradictory. Yet school texts have stood ironclad and unregenerate against such Lilliputian barbs. Whether the grammar now being taught is both clear and true is not the concern of this study, though that question is of vital importance.

In the schools where the description of grammatical structures is to be taught, this study has one very strong implication as to how it should not be taught. At present the study of grammatical structures is cut up into little gobbets and scattered widely over several years of the English curriculum. One consequence of this scattering is that "grammar is always reviewed but never taught." No English teacher knows which fragments previous teachers have undertaken. Every teacher discovers that in a given class of children some know considerable grammar and others just as able know virtually none. Perhaps by always passing the buck to some other teacher we escape seeing how unsuccessful we are collectively.

This scattering appears to be motivated at least in part by the notion that some structures are used only by older children and so should be taught only to them. Against such motivation this study provides strong evidence. The structures studied here are at least as complex as those studied in most school grammar courses. Indeed they are probably more complex than those taught in most college courses called "Advanced Grammar." Yet they are virtually all used by fourth graders and are used often enough and successfully enough to indicate that fourth graders command them. This study provides no justification for teaching some structures early and others late. Indeed it provides no justification for not going straight through a description of grammatical structures once such a course is begun. The student's practice is years ahead of the course anyway. The course need not pretend to be waiting for his practice to catch up.

Although the average child in the fourth grade produces virtually all the grammatical structures ever described in a course in school grammar, he does not produce as many at the same time—as many inside each other, or on top of each other—as older students do. He does subordinate some clauses to others, but not as many. He does reduce some coordinated clauses to coordinations inside a single clause, but not enough. He does put several clauses into a T-unit, but not as many as older students do. He does write some complicated nominals, but his are never most highly complicated. It is what the older student does *in extremis* that especially distinguishes him.

Take an oversimplified analogy: Suppose you taught a youngster first to juggle two tennis balls. Suppose then you taught him to juggle two baseballs. In a sense, he could now be said to be able to juggle two tennis balls and two baseballs, four balls in all. But if you suddenly told him to juggle all four at the same time you can be sure he would drop them all. Only years later will be be able to handle all four at once successfully.

14-2. Something to Attain

The following passage is perfectly grammatical. Furthermore it is clear, and, in a way, effective. But no reader of this study can fail to see that it is not written the way an older student would write it or would want to write it. What would the English curriculum do if it chose, as one of its primary tasks for eight years, the job of converting to normal mature writing this piece of perfectly normal fourth grade writing?

> We rode some more and finally we got there.
> Right away we started to fish.
> We couldn't fish where we were because some other people came and they had two babies with them.
> You know how babies are.
> We moved over onto another point.
> I could see little minnows in the water
> I got my pole and got a worm.
> I put my pole in the water and waited.
> Finally I got a bite.
> I pulled on the pole.
> My brother was excited.
> I caught a little fish.
> He was about four inches long.

> Right after I caught a fish my brother caught a fish.
> His was about five inches long.
> Then I caught another fish.
> He wasn't big at all.
> He was about two inches long.
> After we fished a while we went to the car to eat.

This study suggests a kind of sentence-building program that probably has never been produced, or at least not systematically and fully. The aim would be to widen the student's span of grammatical attention and concern. The method would be for him to reduce independent clauses to subordinate clauses and nonclauses, consolidating them with adjoining clauses and T-units. He could work up to structures of considerable depth and complexity comparable to those exhibited by twelfth graders and superior adults.

He might or might not also break down complicated structures into simple clauses, though the whole process has both deductive and inductive aspects. To a certain extent writing teachers have always used this method. It would be possible of course to do a great deal more of it, using the student's own writing, other writer's sentences, and of course specially prepared exercises.

Persons familiar with transformational grammar will see immediately that the process here suggested is analogous to the process first described by Zellig Harris and then more precisely by Chomsky: "In addition to the transformations . . . which convert sentences into sentences . . . we must construct others which convert pairs of sentences into single sentences" (*Proceedings of the Third Texas Conference*, p. 142). The longer and more complicated T-units written by older students require more and more of these recursive "sentence-combining transformations" which used to be described as operating on the strings underlying "kernel sentences."

Obviously the kind of program envisioned here could be incorporated into a course in transformational generative grammar. But surely it need not be. Surely any reader of this report has been able to see the possibility for consolidating certain clauses and T-units as they were presented. If those examples have been clear, then the whole matter could be approached in somewhat that fashion. In teaching English to foreigners it is now customary to provide a great deal of drill in producing the language, but a minimum of abstract analytical description. Production is the sole aim. Perhaps a comparable program is feasible for native speakers and writers.

If proficiency in this process is the most significant factor of growth in sentence maturity, then a teacher is certainly tempted to try to hasten that growth. Perhaps the student with a broad repertoire of equivalent structures has the same advantage as a student with a high vocabulary.

Of course, forced growth is not always firm growth. Perhaps the older students' proficiency comes only as a result of years of psychological and experiential maturing. It may come only with the development of all thought processes. In that event, attempts to force the growth will be futile. It is even possible that injudicious forcing is worse than futile. The centipede who ceased to crawl because he never knew which leg it was best to move first is no fiction. More than one child has been debilitated by excessive self-consciousness. Nonetheless, some extensive experiments need to be made.

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SOME KEY FINDINGS

A T-unit is one main clause expanded at any of many different points by structures that are modifiers or complements or substitutes for words in the main clause.

T-unit length is tied closely to maturity. Superior adults revealed that they differ from twelfth graders primarily in the length of their clauses.

The major growth in T-unit length occurs in the nominal structures. A slight growth occurs in the verb auxiliary and in the main verb. Older students also extend their nominals by using more noun clauses and "near-clauses."

The younger student produces short separate units. His span of grammatical concern or attention is narrow. As he matures, he consolidates by discarding needless words; his redundancy lessens and his succinctness gains.

The study determined that the average student when he gets his diploma writes T-units nearly 60 percent longer than he could eight years earlier.